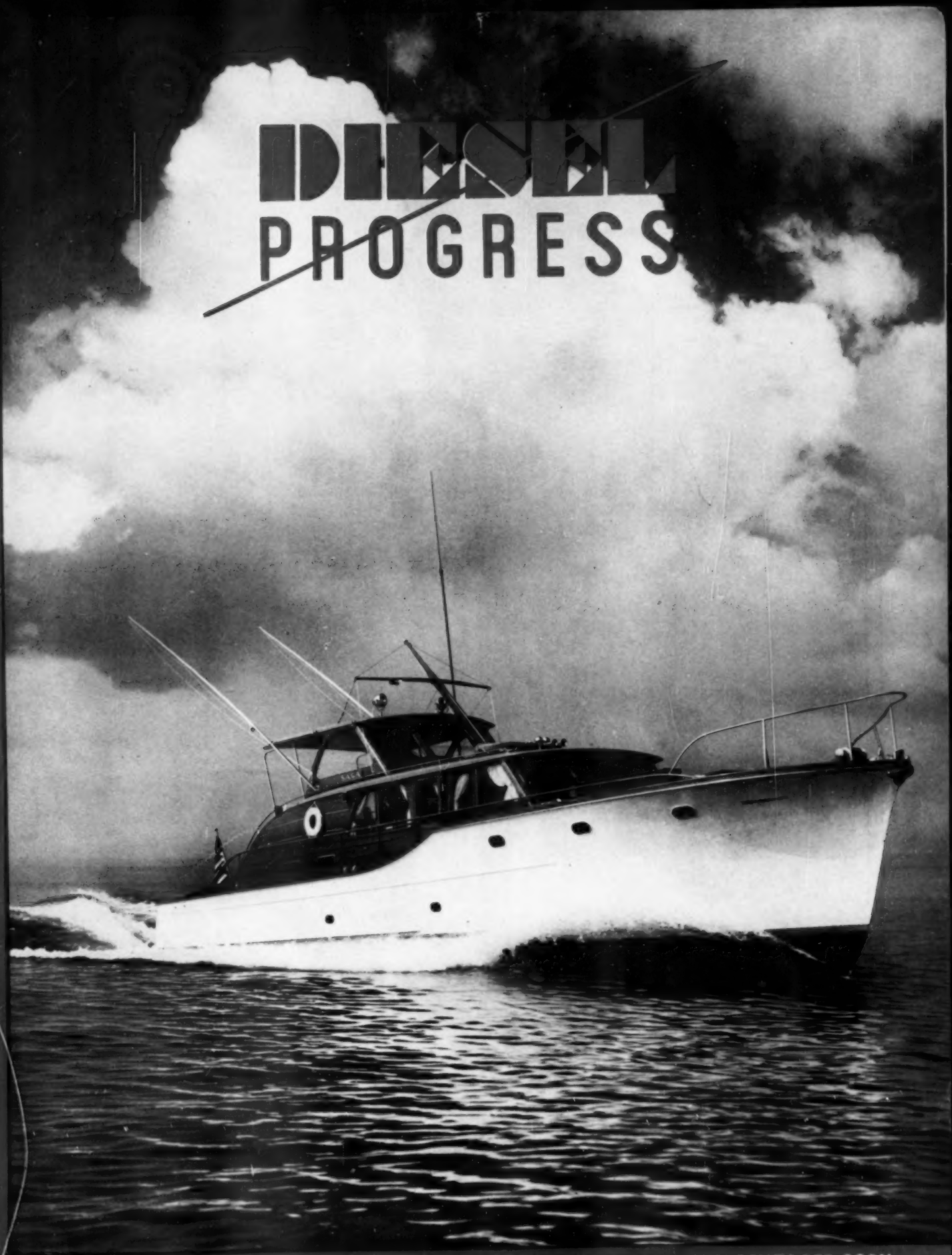
DIESEL PROGRESS

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR



FIVE DOLLARS PER YEAR

JANUARY, 1952

FIFTY CENTS PER COPY

GETS FULL POWER-PLUS ECONOMY

...with the help of TEXACO URSA OILS

As in the plant illustrated, operators of Diesel, gas, and dual-fuel engines everywhere are getting full power and low maintenance costs with the help of *Texaco Ursa Oils*. These oils reduce fuel consumption because they keep rings free, ports open, and valves functioning properly — assuring better compression and combustion.

Texaco Ursa Oils are world-famous for their ability to resist oxidation and sludging, to stand up under heat and pressure, and keep engines clean for trouble-free performance. You get longer service life from bearings and all moving parts . . . increased efficiency and reduced maintenance costs.

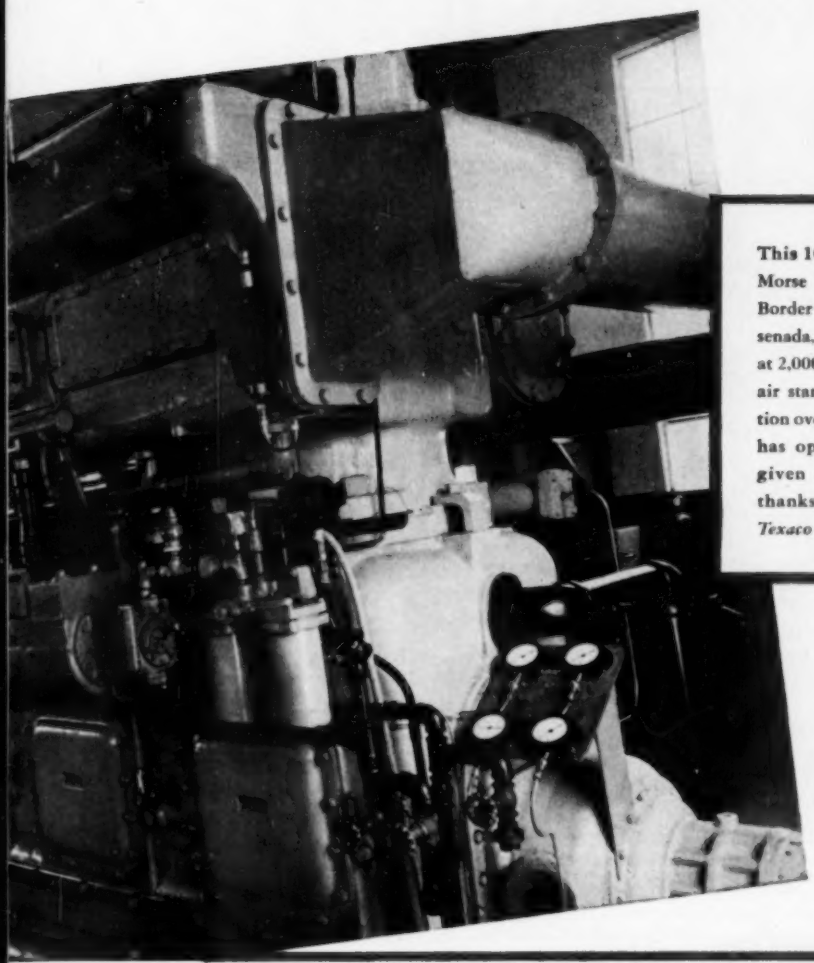
Texaco Ursa Oils are available in every needed

TUNE IN . . .
TEXACO STAR THEATER
starring
MILTON BERLE
on television
every Tuesday night.
METROPOLITAN OPERA
radio broadcasts every
Saturday afternoon.

TEXACO

TEXACO

DIESEL PROGRESS for January, 1952, Volume XVIII, No. 1. DIESEL PROGRESS is published monthly by Diesel Engines, Inc., 816 North La Cienega Boulevard, Los Angeles 46, California. Rex W. Wadman, President. Subscription rate: $5 per year, single copy, 50c. Acceptance under 34.64, P. L. & R., authorized.



This 10-cylinder Fairbanks-Morse Diesel engine in the Border Electric Company's Ensenada, Mexico, Plant is rated at 2,000 h.p. at 300 rpm, and is air starting. Since its installation over a year ago, this Diesel has operated smoothly and given economical power — thanks to lubricating with *Texaco Ursa Oils exclusively.*

viscosity. Approved by leading engine manufacturers and recommended by users from coast to coast, they are easily America's favorite. In the Diesel field alone:

For over 15 years, more stationary Diesel h.p. in the U. S. has been lubricated with Texaco than with any other brand.

A Texaco Lubrication Engineer will gladly show you how *Texaco Ursa Oils* will reduce costs in your operation. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

☆ ☆ ☆

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

URSA OILS FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

Faithfully yours TEXACO 50 *for Fifty Years*

they never sleep

This pumping station is typical of scores of crude oil and oil products' pipe lines, where Alco Diesels are pumping over 6 million barrels daily.

You can depend on ALCO DIESELS

Experienced pumping station superintendents say they want engines that stay awake . . . and can be depended upon for long periods of operation with minimum maintenance. That's why so many of them prefer Alco Standardized Diesels. For example, 37 Alco engines rolled up 814,752 hours with only .02% hours unscheduled shutdowns, in one typical installation.

Pumping station superintendents like Alco Economy, too.

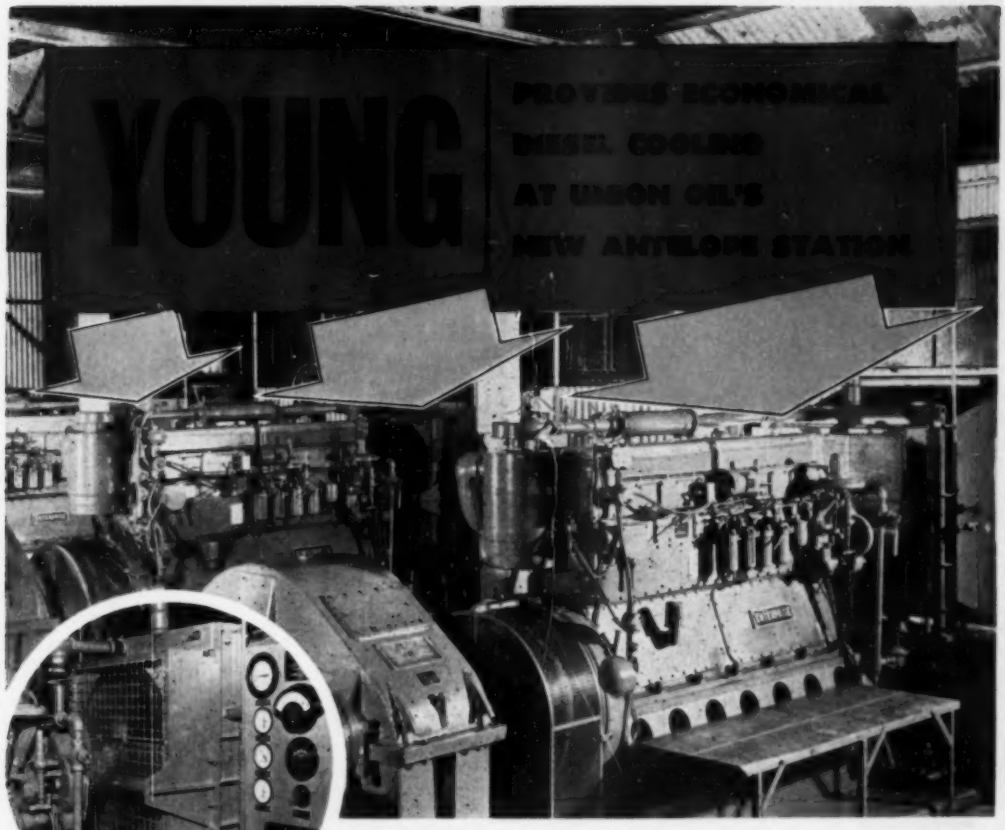
- **Compactness means lower building costs.**
- **Higher engine efficiency means lower fuel costs.**
- **Flexible power range means easy expansion.**
- **Medium speed design cuts ½ the cost of principal auxiliary equipment.**

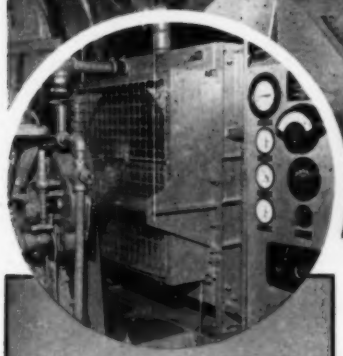
Investigate Alco Standardized Diesels today and find out why in the last 10 years *more of these engines have been installed in oil pipe line pumping service in the United States and Canada than any other make.* Contact your nearest American Locomotive Company Sales Office at Beaumont, Chicago, Cleveland, Houston, Kansas City, New York, San Francisco, Schenectady or St. Louis.

ALCO DIESELS

THE MARK OF MODERN ENGINEERING

AMERICAN LOCOMOTIVE COMPANY





8 REASONS WHY YOUNG "MONO-WELD" RADIATORS GIVE TROUBLE-FREE SERVICE

1. Fabricated steel top and bottom provide rugged, solid support base for core.
2. Steel channel side members assure rigidity necessary for mobile use.
3. Cores of chosen specification for the particular services are designed, reinforced and built to meet rugged industrial service.
4. Tank structure adaptable to requirements of capacity, size and location of water connections.
5. Cast aluminum air foil or reinforced stamped steel blade type fans available. Offer highest air delivery with lowest power consumption.
6. Fan shrouding specially designed to provide maximum air flow to all areas of the core.
7. Heavy-duty, over-size fan bearing assembly designed by Young to handle all radial and thrust loads.
8. Rigid fan shaft bearing and motor support securely fastened to radiator frame with formed steel reinforced members.

Increased operating economy and self-sufficiency have been attained at the new Antelope Booster Station of the Union Oil Company. Young "Mono-Weld"* Radiators fit into the picture perfectly. They provide thrifty jacket water cooling for the three Enterprise Diesels installed. Also, the maintenance problem is minimized by the rugged welded steel construction of the Young units (see features at left) capable of withstanding the stresses of mobile equipment application. Your nearest Young Representative will gladly point out the advantages of "Mono-Weld"* Radiators for your applications.

* Trade Mark

We will be pleased to send you a copy of Young Catalog No. 1651, giving the design and construction details of one-piece and sectional type "Mono-Weld"* Radiators.

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Heat Transfer Products for Automotive and Industrial Applications.

Heating, Cooling, Air Conditioning Products for Home and Industry.

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Everywhere

YOU'LL see this sign wherever you go. General Motors Diesel distributors and dealers are located all along the coastal and inland waters of America—ready to answer your call for quick adjustments, repairs, or factory-engineered parts for Series 71 and 6-110 GM Diesel Engines.

GM Diesel service is available throughout the rest of the world from General Motors Overseas Operations and General Motors Products of Canada, Ltd.

GM GENERAL MOTORS DIESEL POWER SALES and SERVICE

SEE the GM Diesel Display in Space I, Main Floor, at the 1952 National Motorboat Show in New York, January 11-19.

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LOUISIANA MARINE REPAIR SERVICE CO., INC.
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Single Engines...32 to 275 H. P. Multiple Units...Up to 800 H. P.

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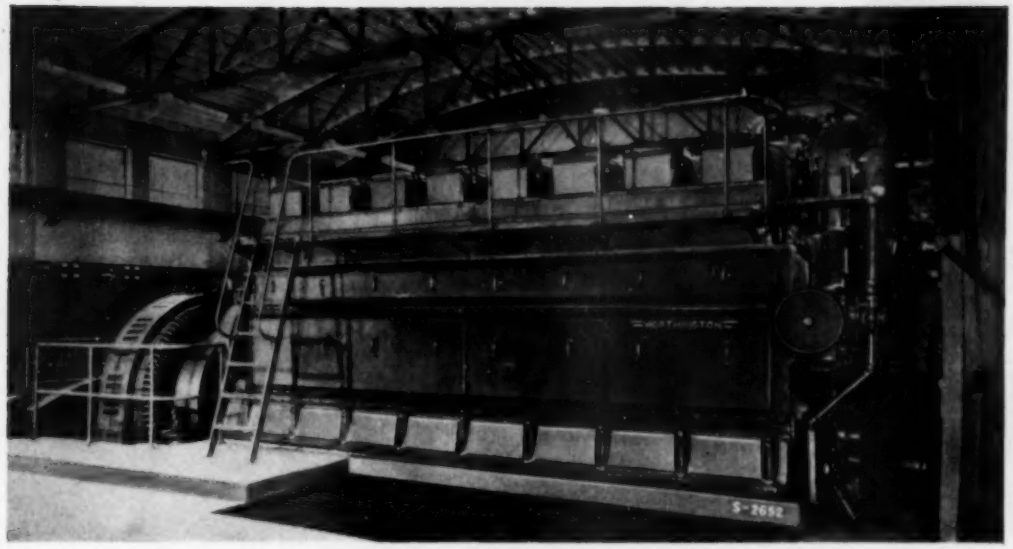
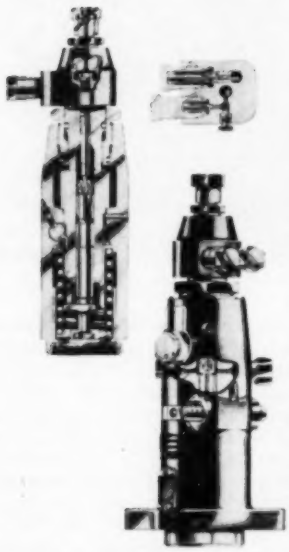


This Diesel Is Ready

FOR A CHANGE IN DIET



Worthington-designed dual plunger fuel pump.

Right now this Worthington Diesel—one of three 1760 hp units owned by the city of Tarboro, N. C.—is operating on oil.

But they anticipate natural gas in this area, and this Diesel is ready for it. With slight changes, it can easily be converted.

Worthington-designed dual plunger pumps now completely fuel this engine with oil—producing more perfect atomization, making possible the use of a *heavier* grade of oil. Also: firing pressures are reduced, exhaust temperatures, too, and combustion is improved.

When the conversion to gas is made, the dual plunger pumps will furnish pilot oil for ignition. Conversion is made quickly and at low cost.

For any engine application, call on Worthington—an engine for any fuel: oil (crude or regular), gas or "dual fuel". Worthington's complete line of engines assures you of the most economical operation no matter what fuel you use.

Only Worthington dual fuel engines offer such exclusives as dual plunger pumps, gas micro-metering valves for each cylinder, and automatic thermal air control—all built to give optimum performance for the fuel used.

Write for Bulletin S-500-B 31 C, Worthington Pump and Machinery Corporation, Engine Division, Buffalo, New York.

WORTHINGTON

ENGINES

E1.12

ECONOMICAL CONTINUOUS POWER

Diesel Engines, 150 to 2640 hp
Gas Engines, 190 to 2880 hp
Dual Fuel Engines, 345 to 2640 hp

WORTHINGTON-BUILT AUXILIARIES

Engine Starting Compressors

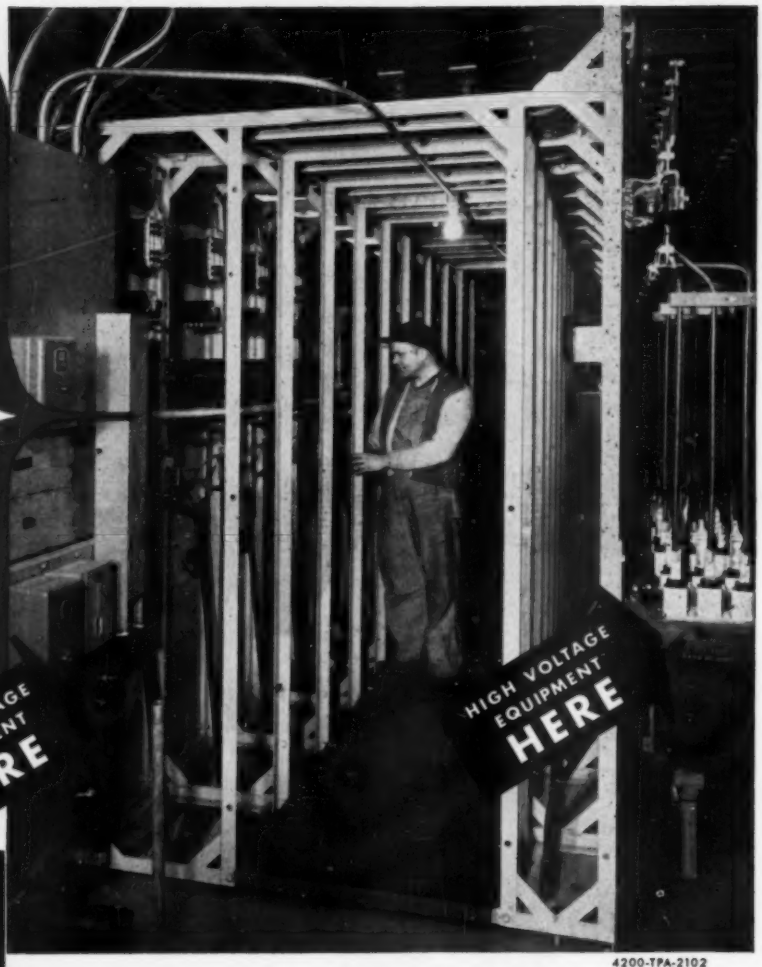
Oil Transfer Pumps

Cooling Water Circulating Pumps

Evaporative Type Engine Water Coolers

Built-in OPEN CENTER AISLE

at Barnesville gives easy access to Switchgear



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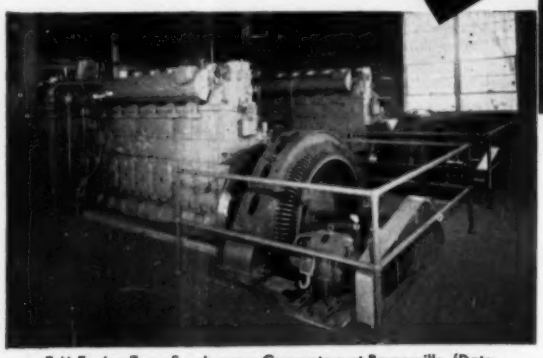
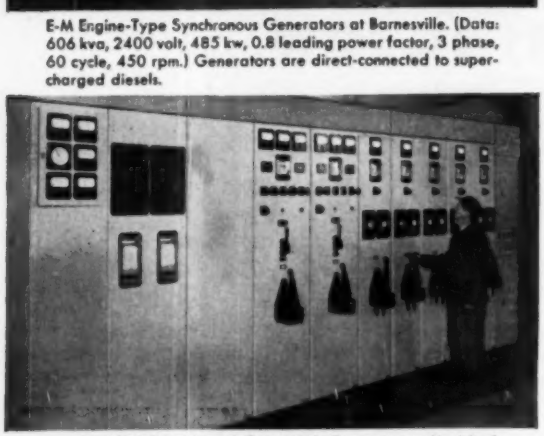


E-M Engine-Type Synchronous Generators at Barnesville. (Data: 606 kva, 2400 volt, 485 kw, 0.8 leading power factor, 3 phase, 60 cycle, 450 rpm.) Generators are direct-connected to supercharged diesels.



Ten-panel E-M Switchboard, Center Aisle Type, at new Municipal Plant. Includes 1 synchronizing equipment swing panel, 1 voltage regulator and meter panel, 2 generator control panels, 5 feeder panels and 1 blank panel for future expansion.

Three feet of aisle space built into your switchgear can represent the accident that *won't* happen . . . if you plan ahead for operating safety.

Take a look at your own power installation. Do you have to walk dangerously close to high voltage equipment to get within reach of low voltage apparatus? They don't at Barnesville, Minnesota!

Back of the Barnesville Switchboard, the operator enters E-M's Built-in Center Aisle through a locked door in the special safety fencing. He walks down a clean, well-lighted aisle free of obstructions. Non-slip flooring and a sturdy protective enclosure safeguard him further. He makes checks and gets maintenance work done easily and safely.

This special E-M Center Aisle Switchgear is pre-assembled and wired correctly and efficiently at the factory, but has none of the undesirable jammed-together compactness of most factory assembled switchboards. It is as attractive and as easily adapted to its surroundings as if it had been constructed right at your job.

In addition to Switchgear, the E-M power package for your plant includes matched Generators. You get the advantages of highly skilled E-M factory construction plus long experience in planning basic design to meet your specific needs.

It will pay you to call your nearest E-M field engineer for facts and data, at no obligation. Or if you wish, write the factory for E-M Publication No. 194.

ELECTRIC MACHINERY MFG. COMPANY

MINNEAPOLIS 14, MINNESOTA

IN TEN YEARS' OPERATION...

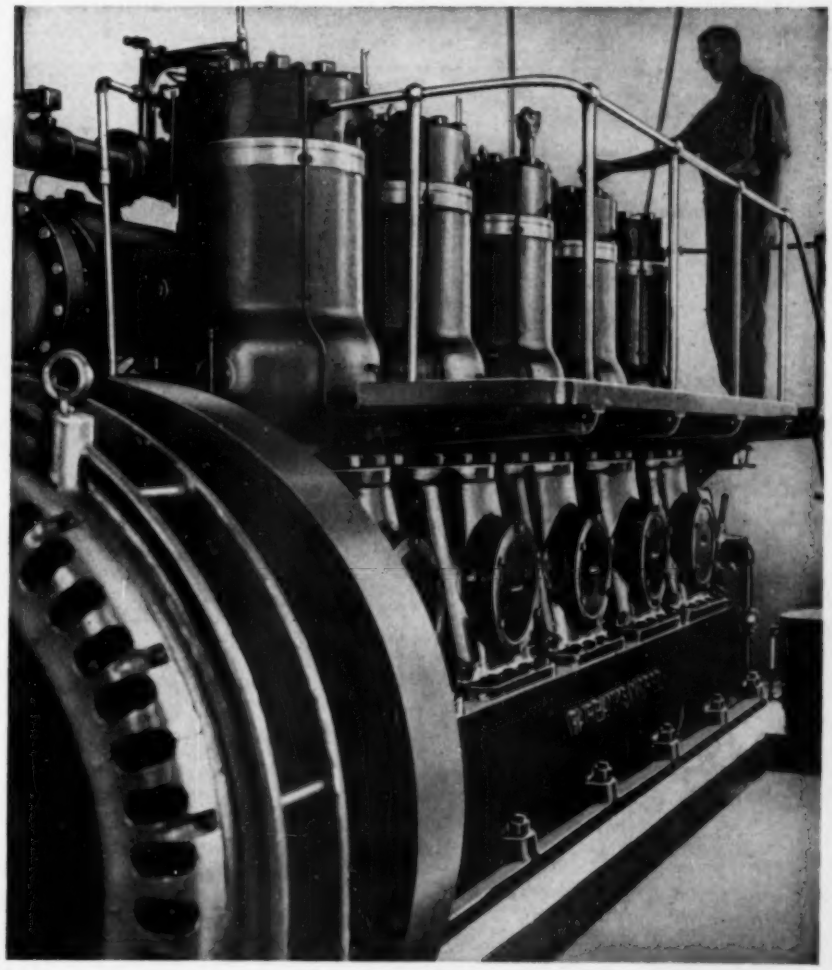
"Never Shut Down, Never Changed A Cylinder Liner!"

...CITY OF GRESHAM POWER AND LIGHT CO., WIS.

● The City of Gresham Power & Light Company of Gresham, Wis. has two Fairbanks-Morse diesels and two hydro-electric units driven by water power. In the diesels, Mr. M. Fisher, Plant Superintendent, has been using Sinclair Gascon D. One of the engines has used this oil for 10 years.

Mr. Fisher reports that these diesels are running at high efficiency, and hardly ever need attention. He says, "We are getting ideal operation with no appreciable ring wear. We have never had a shutdown due to mechanical failure and have never changed a cylinder liner. I have a lot of confidence in this engine and in Gascon Oil."

Sinclair Gascon® Oil can save wear, trouble, and retard replacement in your diesels, too, as it has in scores of installations throughout the country. For more details of this fine lubricating oil, phone or write your local Sinclair Representative or write direct to Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y.



The 5 cyl. Fairbanks-Morse, 375 hp., 300 rpm. diesel of the City of Gresham Power & Light Co. plant. This runs 16 hours a day, needs little attention, thanks to Sinclair Gascon Oil.

Sinclair Diesel Lubricants

SAVE WEAR AND REPLACEMENT

Cummins® Diesels do so many jobs... so much better

...because they're custom-built to fit the job!

On-highway trucks, buses

Industrial locomotives, cranes, shovels

Logging yarders and loaders, crawler tractors

Drilling rigs, centrifugal pumps, generator sets

Earthmovers, off-highway trucks

Work boats, pleasure craft

Lightweight, high-speed Diesels (50-550 hp) for these and many other uses

Diesel power by CUMMINS

CUMMINS Diesel

TRADEMARK REG. U. S. PAT. OFF.

...because they're

BUILT NOT ONCE BUT TWICE

Need rugged power? Then you need lightweight, high-speed Cummins Diesels, custom-built to fit your needs. Each engine is built *twice*. It's assembled, run-in tested, disassembled and inspected, then reassembled and tested again. Consider Cummins' craftsmanship; the exclusive Cummins fuel system; our efficient and expanding parts and service organization. These all add up to minimum "down-time", more power and profit for the user. See your Cummins Dealer.

CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

Export: Cummins Diesel Export Corporation • Columbus, Indiana, U.S.A. • Cable: Cumdiex

KOPPERS piston rings save time, labor and money

in all kinds of equipment

Railroads, trucks, buses, airplanes, cars, pumps . . . in every conceivable use of piston rings . . . Koppers provides *better* oil control, *more* power, *less* wear, *longer* life for expensive equipment!

Koppers K-Spun Piston Rings, produced by centrifugal casting process, are *100% stronger . . . four times more resistant to combustion shock than ordinary rings! They will not break in installation or for the life of the engine.*

Koppers Porous Chrome* Rings have a porous chrome surface that holds and distributes oil during break-in, quickly wears down to perfectly seated solid chrome that prevents grit and other particles from embedding in the ring surface where they can scratch cylinder walls. Porous Chrome Rings last up to four times as long as other rings, reduce cylinder wear 50% or more. That's why hundreds of companies are reporting amazing savings in equipment and maintenance costs through the use of Koppers Rings. Remember . . . we make rings for any equipment that uses piston rings.

*VAN DER HORST PROCESS

If you have a piston ring problem, why not get the *right* answer from us? Write, wire or phone Koppers Co., Inc., Piston Ring Dept., 1581 Homburg St., Baltimore 3, Md.

KOPPERS

KOPPERS

AMERICAN HAMMERED

PISTON RINGS

SPECIFY: Fast's Couplings . . . Koppers Piston Rings . . . both famous products of the Koppers Co., Inc.

ONLY KOPPERS CAN FURNISH K-SPUN OR POROUS CHROME!

Season-Right

and rigidly controlled for operation at zero as well as tropic temperatures

Ashland special DIESEL

fuels and lubricants

A heavy logger working in the icy north woods would have a hard time operating on the same fuel used in an earth-mover down south. Destination and end use—even seasonal temperature changes—determine specifications of the various types of Ashland Diesel Fuel. Through careful blending we assure each customer, regardless of location and use, equally fine operation.

Ashland always provides a quick-starting fuel, correctly balanced for atmospheric conditions, so it will maintain free flow through pumps and injector equipment. Cetane number is accurately controlled to assure smooth operation and highest efficiency. Since exhaust fumes and smoke are objectionable in some operations, such as city busses, this, too, is considered when fuel recommendations are made.

Our trained sales engineers are available for consultation on any special requirements for fuel and lubricants. Contact our nearest sales office or supply terminal.

...complete line of lubricants for diesel equipment

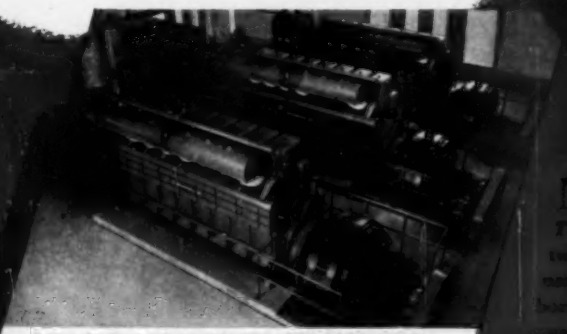
ASHLAND OIL & REFINING COMPANY

ASHLAND, KENTUCKY

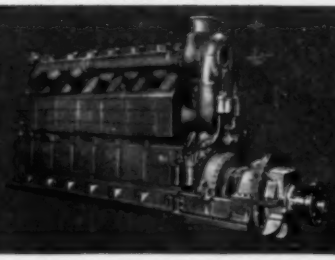
SUPPLY TERMINALS: Ashland, Ky. — Buffalo, N. Y. — Canton, O. — Cincinnati, O. — Cleveland, O. — Erie, Pa. — Evansville, Ind. Findlay, O. — Follansbee, W. Va. — Freedom, Pa. — Kenova, W. Va. — Kobuta, Pa. — Louisville, Ky. — Marietta, O. — Nashville, Tenn. — Niles, O. — Paducah, Ky. — Pittsburgh, Pa. — St. Elmo, Ill. — St. Louis, Mo. — Toledo, O.

How to DOUBLE YOUR HORSEPOWER WITHOUT INCREASING YOUR FLOOR SPACE.....

with the NORDBERG *Supair Thermal Engine*



Above: Three 8-cylinder Nordberg FS-138-HSC, *SUPAIR-THERMAL* 1000 kw, 450 rpm generating units at N. V. Overzeese Gas En Electriciteit Maatschappij, an electric utility in Aruba, N. W. I.

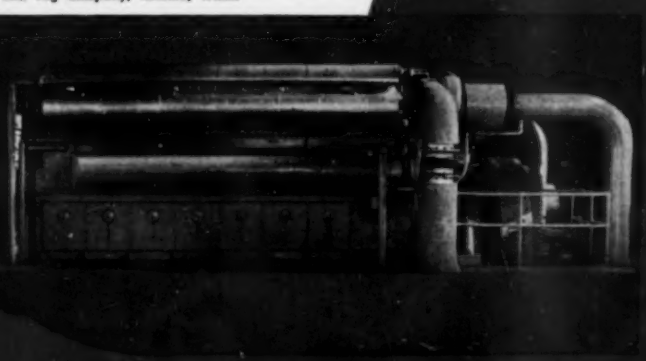


Above: Nordberg 6-cylinder FMD-136-HSC, *SUPAIRTHERMAL* engine developing 800 bhp at 300 rpm, for direct drive—direct reversing—propulsion of tugboat owned by Foss Launch and Tug Company, Tacoma, Wash.

Now, with the Nordberg *SUPAIR-THERMAL Engine*,* you can actually get twice the horsepower output over an ordinary normally-aspirated engine of the same bore, stroke and speed . . . without any increase in floor or overhead space. Thus, you can pack twice the power in a limited plant space, or in an engine room on board ship.

In addition to doubling the horsepower in the same space, the *SUPAIRTHERMAL Engine* produces more horsepower hours per unit of fuel and lube oil . . . with lower installation cost. Maintenance cost per horsepower generated is also lower.

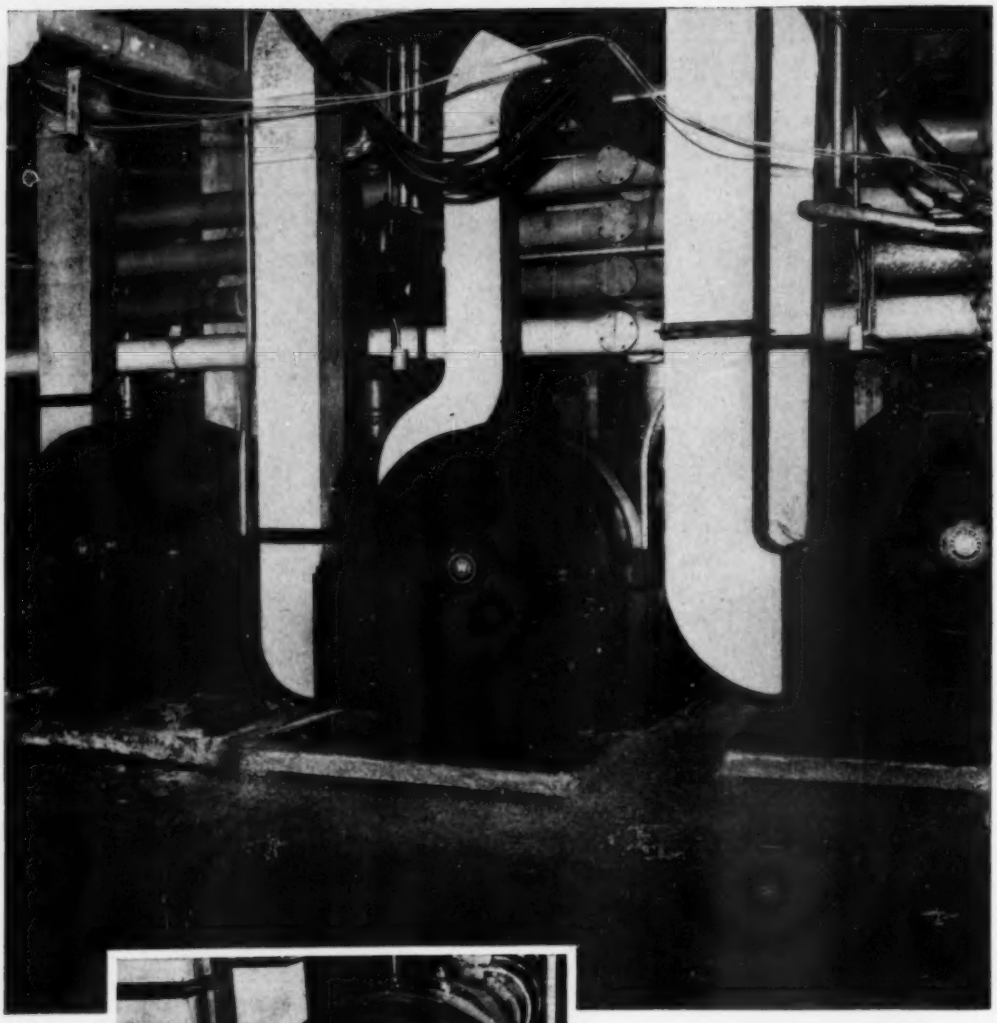
Here, then, is the outstanding engine in the entire Diesel field . . . available for all power applications, in a full range of 4-cycle types for fuel oil, Dieselol, or spark ignition gas operation—in sizes from 425 hp upward. *For full details on the SUPAIR-THERMAL Engine write for BULLETIN 191.*

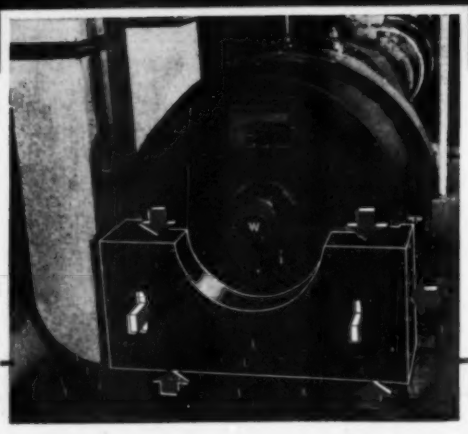


NORDBERG MFG. CO.
Milwaukee, Wisconsin

A DIVISION OF NORDBERG

NORDBERG
DIESEL ENGINES





The above is a typical forced-ventilated installation. These same ducts could have been brought into these motors from any angle as shown by the arrows on the inset at the left.

WHERE FORCED VENTILATION IS REQUIRED . . .

Westinghouse Air Inlet Brackets Offer Complete Flexibility of Installation

From the top, bottom, front or either side . . . ventilating ducts or pipes may be brought in from practically any angle to this forced-ventilated, large induction motor. It's the ventilation system and design of the air inlet brackets that make this possible.

Ventilating air is supplied to the motor from both ends through the two air inlet brackets. These brackets can be supplied with duct or pipe connections located on any of the exposed surfaces. Thus, many installation problems are eliminated and the motor can be positioned without regard to the space available for duct work.

The ventilating air is discharged from both sides of the motor through louvered openings. If desired, these openings can also be housed so that the exhausted air can be routed away through similar ducts or pipes.

Other important Westinghouse features that you will want to consider in selecting your next large induction motor are:

Bearing construction and end enclosures make bearing inspection, cleaning, servicing and replacement as easy as on a standard open motor.

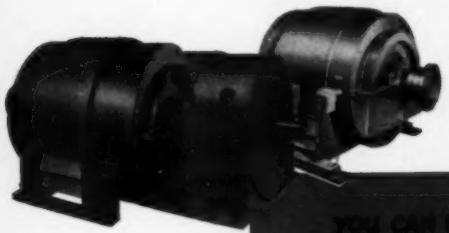
Welded steel construction to form a sturdy frame.

Insulation of great dielectric strength and high heat resistance for long life.

All-metal rotors are dynamically balanced for quiet, smooth operation.

Ask your Westinghouse representative about all the details of this improved large motor or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

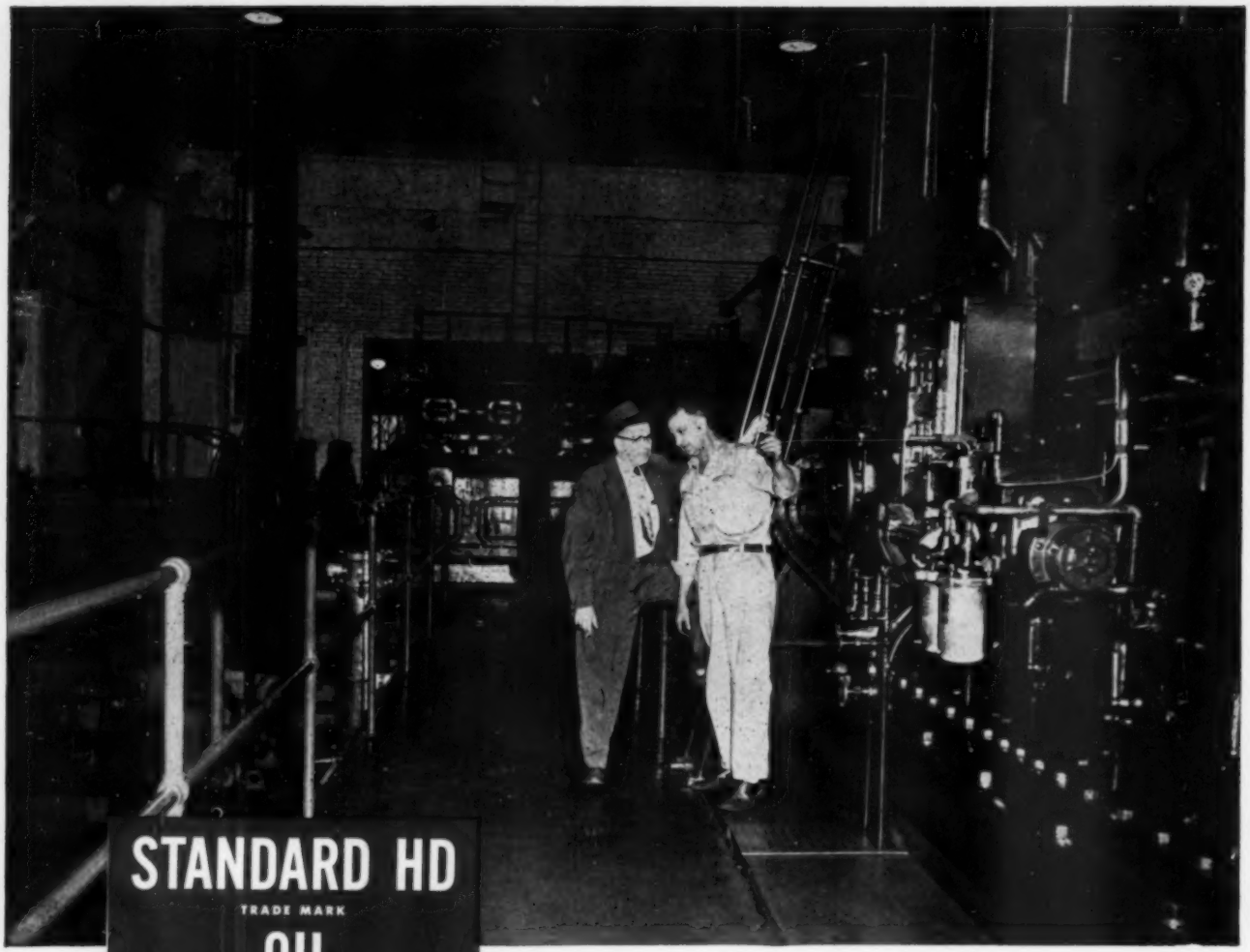
J-10356



Also available are these three types of large induction motors. Open dripproof motors for general service. Outdoor motors for service in the open weather. Splashproof motors for protection against falling liquids or solid particles.

YOU CAN BE SURE... IF IT'S Westinghouse

LARGE INDUCTION MOTORS



Solves a diesel maintenance problem

• Excess cylinder and ring wear plus sludge, varnish, and carbon deposits posed a costly maintenance problem for operators of this municipal power station. Overhauls were scheduled every six months. A full set of rings was installed at every overhaul. That was the situation in 1947 when a Standard Oil lubrication specialist recommended changing to STANDARD HD Oil.

The change was made on one of the station's five diesels. These are the results with STANDARD HD.

Time between overhauls has been doubled, and normally only the two top rings are changed. Cylinder wear has been cut to a minimum, even with the engine operating under heavier loads. The engine has remained clean and there has been no ring sticking. Efficiency has been stepped up from an average of 12.0 KW per gallon of fuel to 12.5 KW per gallon.

These results, the solution of a costly maintenance problem, have led to the use of STANDARD HD Oil in the station's four other diesels. Chances are that a Standard Oil lubrication specialist can help you achieve similar results in the operation and maintenance of your own diesel equipment. Put him to work on your problem today. A call to your local Standard Oil Company office is all that's necessary. Or write: Standard Oil Company (Indiana), 910 South Michigan Ave., Chicago 80, Ill.

STANDARD OIL COMPANY (STANDARD) *(Indiana)*

Crushin' Caliche near Corpus Christi

Big Texas material man cashes in on International performance

Caliche is one of the most widely used forms of crushed rock for highway construction in the Southwest—and it's a tonnage proposition for M. P. Wright, Jr.

One of the largest gravel, sand and caliche producers in the Corpus Christi area, Wright turns out road and driveway material from four large pits near Robstown, Texas.

Mainstays of his operations are eight International crawlers and stationary engines . . . and he figures that their low cost of operation and high power output make a real difference when it comes to adding up profits.

Internationals not only do more work per day, but, as M. P. (Chico) Wright puts it, *"Our Internationals can really take it as well as dish it out. If only all our equipment could stand up like our Internationals, our maintenance problems would sure be easier!"*

Want more proof? Get the low-down from your International Industrial Distributor or Power Unit Dealer. And put International *"Power that Pays"* to work for you!

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS

ALL EQUIPMENT at M. P. Wright's caliche pit No. 3 is powered by an International UD-18 power unit with 4,000 hours under its belt. It turns out 150 cubic yards of material per hour, on 4 gallons of 12-cent diesel fuel.

INTERNATIONAL HARVESTER

INTERNATIONAL

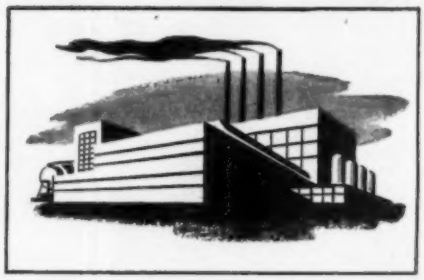
POWER THAT PAYS

Bendix-Skinner

ORIGINATOR OF **MICRONIC** FILTRATION

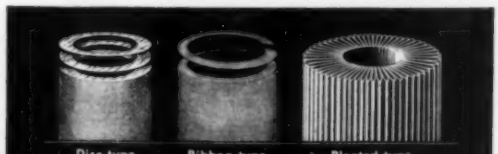
the *Finest*

Way to Make Liquids Come Clean



Nine times out of ten ***Bendix-Skinner*** filters will supply the "finest" answer to your problem. No magic—just the simple fact that ***Bendix-Skinner*** has developed entirely new and exclusive filtering techniques in twenty years of tackling the tough jobs. We'll welcome an opportunity to prove it. An inquiry costs you nothing and may save you much.

***Over 350 Models** providing filtration from 1/2 micron (.000019") upwards at flow rates from 1 to 5000 g.p.m.*



SKINNER PURIFIERS DIVISION OF
1503 TROMBLY AVENUE,
DETROIT 11, MICHIGAN
Bendix AVIATION CORPORATION

Export Sales: Bendix International Division, 72 Fifth Ave., N. Y. 11, N. Y.

ATLANTIC METAL HOSE

GUARDS DIESEL LIFELINES

AIR · FUEL · WATER · EXHAUST

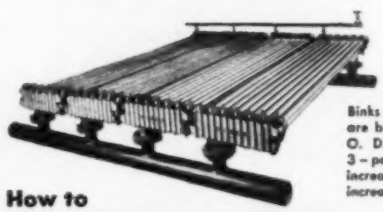
ATLANTIC flexible metal hose does a ***better*** job of controlling vibration of these vital lines and insuring their continuous, trouble free operation—because each section is ***Job Tested and Guaranteed to Do Its Job!***

That's why more and more purchase requisitions read, **"Order from Atlantic for Every Diesel Need!"** Furnished in all workable metals — ¼" - 36" I.D. inclusive . . . with fittings as desired.

Write for Diesel Bulletins 1020 and 50A • See our Catalog in Sweet's File for Product Designers

ATLANTIC

METAL HOSE CO., INC.
102 W. 64th St. • N. Y. 23, N. Y.



Binks Type "D" coils are built of heavy 1" O. D. copper tubes. 3 – pass arrangement increases fluid velocity, increases efficiency.

How to

SAVE COOLING WATER...

and insure uniform heat transfer

When you use Binks Type "D" Heat Exchange Coils, here's what happens:

Hot water from the engine is pumped through the copper tubes of the coils (shown above). The coils are cooled by spraying them with raw water in a standard Binks cooling tower. Because jacket water is circulated through a completely closed system with virtually no evaporation, distilled or chemically pure water can be used economically in the jacket. This eliminates scale formation... increases engine efficiency.

The raw water used for cooling the coils is also recirculated. The only additional water needed is that to compensate for evaporation in the tower.

View showing placement of Binks Type "D" heat exchange coils in a cooling tower in relation to the spray system (at the top).

Send now for Bulletin 41 for complete engineering data.

Binks MANUFACTURING COMPANY
3132-38 Carroll Ave., Chicago 12, Ill.
REPRESENTATIVES IN ALL PRINCIPAL CITIES

A NATION-WIDE *Authorized* SERVICE ORGANIZATION

Bendix

FUEL INJECTION EQUIPMENT

DIRECTORY OF SERVICE STATIONS IN U. S. A.

ARIZONA

Phoenix, Charlie C. Jones Battery & Elec. Co., 300-322 West Jefferson St.

CALIFORNIA

Los Angeles 21, Magneto Sales & Service Co., 751 Towne Ave.
Sacramento 1, Langer & Rifkin, 1116 Fifth Street
San Diego 1, Magneto Sales & Service Co., 1254 Kettner Blvd.
San Francisco 3, Furrer & Uster, Inc., 225—7th St.
San Francisco 3, H. G. Makelim Magneto Repair Co., 1583 Howard Street
Wilmington, Diesel Control Corporation, 218 North Marine Ave.

COLORADO

Denver 3, Central Supply Co., 1171 Lincoln Street

FLORIDA

Jacksonville 1, Spencer Electric Co., Inc., 40 West Beaver Street
Miami 36, Florida Diesel Service Co., 1930 North Miami Ave.

GEORGIA

Atlanta 3, Auto Electric & Magneto Co., 477 Spring Street, N. W.

ILLINOIS

Chicago 16, Illinois Auto Electric Co., 2011—37 Indiana Ave.
Rock Island, Lahse Automotive Service, Inc., 430 North Capitol Ave.

INDIANA

Indianapolis, Gulling Auto Electric Inc., 450 North Capitol Ave.

IOWA

Cedar Rapids, Edwards Carburetor & Electric Co., 209 Seventh St., S. E.
Des Moines 9, Electrical Service & Sales Co., 1313 Walnut Street

LOUISIANA

New Orleans 13, John M. Walton, Inc., 1050 Carondelet Street
Shreveport, Vaughan Tractor & Auto Parts Co., 224 Airport Drive

MARYLAND

Baltimore 1, Parks & Hull Automotive Corp., 1033 Cathedral Street

MASSACHUSETTS

Boston 15, W. J. Connell Co., 121 Brookline Ave.

MICHIGAN

Detroit 2, Knorr-Maynard, Inc., 5743 Woodward Ave.

MINNESOTA

Minneapolis 2, Reinhard Bros. Co., Inc., 11 South 9th Street

MISSOURI

Kansas City 8, Electrical & Magneto Service, Inc., 2538 Grand Ave.
St. Louis 23, Diesel Fuel Injection Service Co., 9331 South Broadway

NEBRASKA

Omaha 2, Carl A. Anderson, Inc., 16th and Jones Street

NEW JERSEY

Newark 2, Tire Trading Co., 239 Halsey Street

NEW YORK

Brooklyn 16, E. A. Wildermuth, Inc., 1102 Atlantic Ave.
Brooklyn 32, A & D Diesel Service, Inc., 677 Fourth Ave.
Buffalo 8, Hettrich Electric Service, 1032 Ellicott Street
Syracuse 4, F. A. Crossman, Inc., 943 Genesee Street
Troy, Ehrlich Electric Service, Inc., 200 Fourth Street

OHIO

Cleveland 14, Cleveland Ignition Co., 1301 Superior Ave., N. E.

OKLAHOMA

Tulsa 3, Magneto Ignition Co., 701 West 5th Street

OREGON

Portland 14, Automotive Products, Inc., 1700 Southeast Grand Ave.

PENNSYLVANIA

Philadelphia 32, J. W. Parkin, Jr., 2251 North Broad Street
Pittsburgh 13, Automotive Ignition Co., 6358 Penn Ave.

TENNESSEE

Memphis 4, Automotive Electric Service Co., 982 Linden Ave.

TEXAS

Dallas 1, Beard & Stone Electric Co., 3909 Live Oak St.
El Paso, Oakes Battery & Electric Co., 423 Texas Street
Houston 1, Beard & Stone Electric Co., Milam at Polk Street
Houston 11, Magneto & Diesel Injector Service, 6931 Navigation Blvd.
Odessa, Electric Service & Supply, 1601 North Grant Street

VIRGINIA

Norfolk, Diesel Injection Sales & Service, 808 Union Street
Richmond 20, Charles H. Woodward Electric Co., 709 Broad Street

WASHINGTON

Seattle 1, Seattle Injector Co., 2706—2nd Ave.
Seattle 14, Sunset Electric Co., 300 Westlake, North
Spokane 8, Sunset Electric Co., North 703 Division St.

WISCONSIN

Milwaukee 2, Wisconsin Magneto Co., 918 North Broadway

CANADA

Quebec—Montreal—International Electric Co., 1037 Bleury St.
British Columbia—Vancouver—Magneto Sales & Service, Ltd., 126 Gore Ave.

ALASKA, Ter. of

Anchorage, Reeve Alaska Airmotive, Merrill Field, P.O. Box 1160

SCINTILLA MAGNETO DIVISION of
SIDNEY, NEW YORK

Bendix AVIATION CORPORATION

Western Office: 582 Market Street, San Francisco 4, California • Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, N. Y.

DEFENDERS OF FREEDOM

See our exhibit at the Motorboat Show, January 11-19

Our United States Navy submarines with their superb crews will help protect our shores and our shipping from possible enemy undersea craft. Supreme dependability and instant response are required of engines and crews. The United States Navy has installed General Motors engines with Diesel-Electric Drive in submarines of this new "K" class.

Diesel-Electric for Every Type of Service

ENGINES FROM 150 TO 2000 H.P.

GM GENERAL MOTORS DIESEL POWER

Cleveland Diesel Engine Division

CLEVELAND 11, OHIO

GENERAL MOTORS

SALES AND SERVICE OFFICES

Cambridge, Mass. • Jacksonville, Fla. • Miami, Fla. • Montreal, P. Q. • New Orleans, La. • New York, N. Y. • Norfolk, Va. • Orange, Texas
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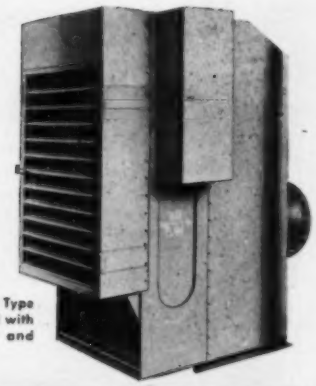
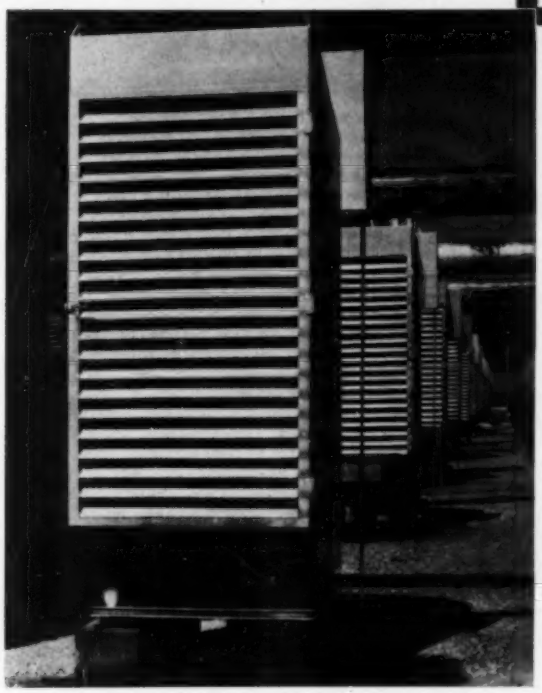
A "MUST" Where There's Dust

Constant efficiency, uniform air delivery—AAF Multi-Duty Air Filters give you both automatically



Typical Multi-Duty Type CMS Filter equipped with weather louvers and plenum chamber.



Write for Bulletin No. 150

Fifteen 2400 H. P. Cooper-Bessemer compressors make up this Hanford, Texas, unit of the Michigan-Wisconsin Pipe Line. Farsighted planning saw to it that dust protection was a part of the basic installation. Recognition of proven field performance resulted in the logical specification—AAF Multi-Duty Type CMS Air Filters.

The Type CMS washes its face regularly without the "mother care" of a maintenance man. Because cleaning of its overlapping panels is both automatic and continuous, high efficiency is maintained regardless of dust load, and uniform air delivery results at all times. Periodic inspection and regular sludge removal (without shutdown) are all that's required to keep this filter in fighting trim the year 'round.

For outdoor living, filters come equipped with protective weather louvers and a plenum chamber for attachment of intake. This chamber also has a perforated metal baffle which dampens intake pulsations and distributes air uniformly over the entire filter curtain area.

If you want to write off the threat of dust, permanently, write in the AAF Multi-Duty Type CMS in your next air filter specifications.

Today's Best Buy is Better Air!

AAF

American Air Filter

COMPANY, INC.

408 Central Avenue, Louisville 8, Kentucky • American Air Filter of Canada, Ltd., Montreal, P. Q.

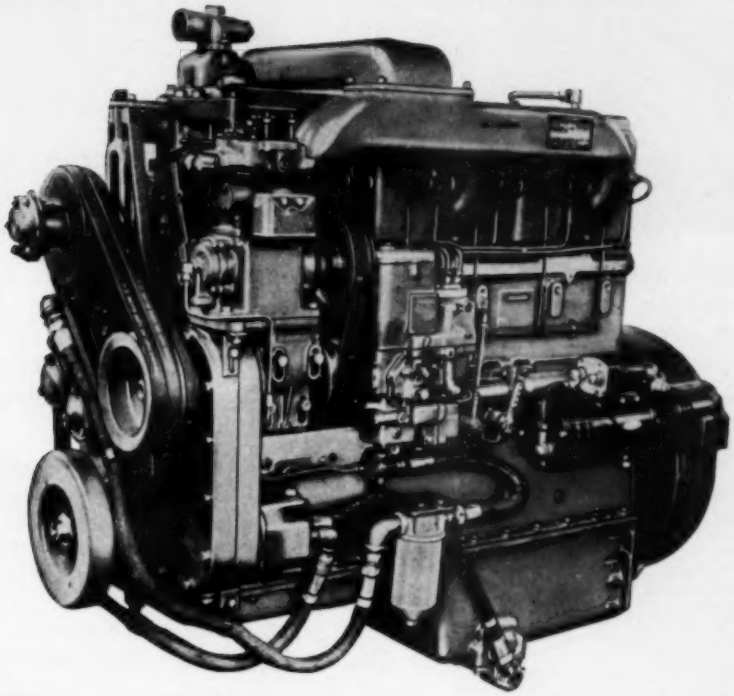
An Unusual Combination—

PRECISION CRAFTSMANSHIP *In* VOLUME PRODUCTION!

HERE at Erie Forge we like to call ourselves specialists . . . specialists in precision forging and machining. We believe in "One Control—One Responsibility". Here under one roof we control every step in the production of the finished product from the raw material to the finished crank. Design, metallurgical control, casting, heat treating, forging and machining are under the watchful supervision of fine craftsmen with many years of experience. Consult with us on your next requirements for crankshafts, connecting rods or allied items.

ERIE FORGE COMPANY, ERIE, PA.

275,000-mile overhaul proves amazing lack of engine wear with Air-Maze full-flow oil filter!



THE PERFORMANCE of the Air-Maze type "O" full-flow oil filter on the engine above proves again how Air-Maze lube oil filters save engine wear.

After 275,000 miles, Consolidated Copperstate Lines of Los Angeles disassembled this "NH" series Cummins Diesel engine and carefully checked the parts for wear. The following figures show that wear was almost negligible:

Cylinder sleeve wear	*.0015 to .0025*
Connecting rod bearing wear	*.002 to .0025*
Main bearing wear	*.001 to .0015*
Crankshaft throw journal wear	*.0005*
Crankshaft main journal wear	*.0005*

The crankshaft itself checked for straightness. There were no cracks. After polishing, the shaft was replaced *without grinding!* The Air-Maze full-flow lube oil filters had effectively removed abrasive dust and dirt from the oil, kept engine wear to a minimum.

Air-Maze's specially *engineered* disc-type design provides unusually large filtering area in small space with low pressure drop. Full-flow oil filters are available in open-circuit units to fit cored cavities or in closed-circuit units for external mountings as shown above. Construction is all-metal. Cleaning is easy.

For help with your filter problems, contact your nearby Air-Maze representative or write Air-Maze Corporation, Cleveland 5, Ohio.

The biggest names in diesels are protected by Air-Maze filters

AIR FILTERS
SILENCERS
SPARK ARRESTERS

AIR-MAZE
THE FILTER ENGINEERS

LIQUID FILTERS
OIL SEPARATORS
GREASE FILTERS

VOLUME SIXTEEN

ENGINES LISTED AND
DESCRIBED IN VOLUME 16

ABOE
American Locomotive
Anderson O'Brien
Atlas Diesel Engine
Baldwin-Lima-Hamilton
Buda
Burmeister & Wain
Caterpillar
Chicago Pneumatic
Clark Bros.
Cleveland Diesel
Consolidated Diesel Electric
Continental
Cooper-Bessemer
Crofton
Cummins
Deere
Detroit Diesel
Electro-Motive
Enterprise
Fairbanks-Morse
Fulton
Graymarine
Hallett
Harnischfeger
Hercules
Hill
Ingersoll-Rand
International Fermont
International Harvester
Lathrop
Lister-Blackstone
Mack
Massey Harris
Murphy
Nordberg
Oliver
Palmer
Rathbun-Jones
John Reiner
Sheppard
Sterling
Stewart & Stevenson
Sun Shipbuilding
Superior
Union
Venn-Severin
Washington Diesel
Waukesha
White-Roth
Witte
Worthington

VOLUME SIXTEEN

A MUST for design and operating Engineers! Indispensable for Buyers! Invaluable to Instructors and Students!

IN NO OTHER BOOK can be found such complete and detailed information on diesel engines and accessories. Rewritten in its entirety while being brought up-to-date, great attention has been given to make Diesel Engine Catalog an easy-to-read book. Its comprehensive classification and indexing all contribute to making any item easy-to-find.

FIVE BOOKS IN ONE, HAVING FIVE INTEGRAL SECTIONS, this catalog is indispensable whether for technical reference or selective buying:

(a) An engine section fully illustrated with complete technical descriptions and specifications.

(b) An accessory section describing engine and plant accessories.

(c) A transmission section describing torque converters, etc.

(d) A classified buyers' guide—"Market Place," covering diesels, accessories, transmissions and other allied products.

(e) A large advertising section. Manufacturers' advertisements carry a wealth of information for design and purchasing engineers.

DON'T HAVE OBSOLETE INFORMATION IN YOUR TECHNICAL OR PURCHASING LIBRARY!

MAKE SURE THE INFORMATION AT HAND IS ACCURATE AND UP-TO-DATE!

EVERY EDITION A SELL-OUT!

$10.00 PER COPY

ORDER YOUR COPY TODAY!

DIESEL PROGRESS

P.O. Box 8458, Cole Station
Los Angeles 46, Calif.

Enter my order today for a copy of the Diesel Engine Catalog, Volume Sixteen, Edited by Rex W. Wadman, for which I enclose $10.00. (Copies may be ordered in Sterling areas by remitting £4:0:0 to E. H. Doddrell, 342 St. Paul's Corner, Ludgate Hill, London, E.C.4.)

NAME.....

ADDRESS.....

CITY..... ZONE..... STATE.....
(PLEASE PRINT)

Here is one-fifth ounce of fuel oil

It hauls

one ton **of freight**

one mile

when burned in a

GM Diesel Locomotive

If all oil- and coal-burning steam locomotives were replaced by Diesels, America would save 182,500,000 gallons of fuel oil and 62,000,000 tons of coal every year.

To conserve fuel America needs more Diesels!

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS

LA GRANGE, ILLINOIS——*In Canada:* GENERAL MOTORS DIESEL, LTD., LONDON, ONTARIO

If you are interested in the conservation of fuel by Diesel locomotives write Electro-Motive Division for a recent study.

YOU can be proud

of your part in building a better America

Something wonderful has happened in our country during the past 10 years, and you have been a part of it.

It all started during the first dark days of World War II.

One of Uncle Sam's biggest problems was how to get a thousand and one things done *voluntarily* on the home front. Public-spirited business leaders offered their services *free*.

They formed The Advertising Council to tell the story. They called upon America's unmatched communications forces to help. Soon millions of messages were going out in magazines, newspapers, radio and posters, without cost to the taxpayer.

Remember this wartime poster?

Wars take money. So the Council got behind the Treasury's War Bond Drives, and the nation responded as it always does to a just cause.

Wars chew up raw materials fast. So the Council helped Uncle Sam conduct salvage campaigns for metals, fats and paper. Again, *you* met the need.

Forest fires were robbing the country of one of our most needed raw materials. Millions of acres of valuable timber were being lost through human carelessness. The Council and Smokey, the fire-preventin' bear, soon made the public forest-fire conscious—and more careful. Vast stores of timber were saved.

Then came campaigns on Victory Gardens, "loose talk," rationing, nurse recruitment and many others. And each time, when they learned of the need, our people acted.

But this voluntary service did not end with the war. By popular demand, the Council began to help such peacetime causes as Savings Bonds, Highway Safety, Community Chests, Red Cross, Economic Education, Crusade for Freedom, Better Schools, Civil Defense and Blood Donation.

Over a billion and a half dollars in advertising space and time have been given freely by American business to do these vital jobs in the public interest. Hardly an American but knows about them and has had some part in their progress.

This publication salutes The Advertising Council on its Tenth Anniversary as a wonderful example of American teamwork. Its achievements are a tribute to the whole American people—to business that supports its activities—to all those devoted workers, in so many fields, who have helped to tell you what needed doing. But most of all to *you* who *did* it!

Reminded by ads like this, contributed by the magazines of America at no cost to Uncle Sam or the tax-payer, you now own over $35 billion in Defense Bonds.

When scrap is needed quickly to keep our defense plants rolling, ads like this, sponsored by leading business and trade publications, help to make that need known.

What the Advertising Council is
. . . and what it does

As it starts on its second decade, The Advertising Council is a fine example of the conscience of America in action. It is a voluntary organization—independent, non-profit, non-partisan—dedicated to the welfare and progress of all our people. The Council donates its services to the causes it aids.

It is composed largely of advertisers, advertising agencies and media, including magazines, newspapers, radio and television, the outdoor and transportation advertising groups.

The Council's budget is contributed by business generally. Space and time for Council programs are donated by advertisers and media. Advertising agencies provide free creative talent for the preparation of campaign materials.

As the first organized, systematic method of getting important messages to the public quickly, the Council annually reviews hundreds of requests for help from government agencies and leading non-profit organizations which have learned that advertising—through simplification, dramatization and repetition—gets things done.

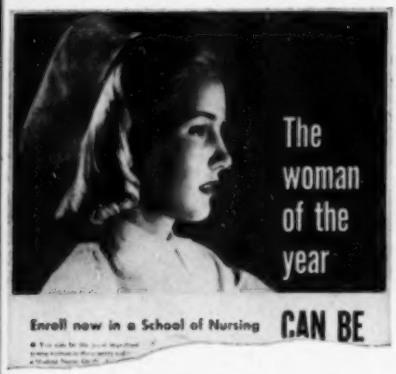
Closely associated with the Council is an Industries Advisory Committee consisting of 38 business leaders and a Public Policy Committee which evaluates requests for campaigns. The latter includes 20 leading representatives of management, labor, education, agriculture, religion, medicine and journalism.

All these good Americans have accomplished much by working together. But so much *more* still remains to be done! This publication is confident that The Advertising Council will continue to do its part by giving you the facts about national problems as they arise, so that in the future as in the past, they will be met in the traditional voluntary American way.

The messages you hear and see over radio and television on behalf of national causes such as CARE, Fight Inflation, Government Reorganization, Racial and Religious Prejudice, March of Dimes and United Nations, are scheduled by the Council. Advertisers, networks and local stations give the time.

The posters along the thoroughfares and in your transportation vehicles often carry messages in the public interest. The space is given by the Outdoor and Transportation advertising industries.

The Council also serves American Cancer Society, American Heritage, Boy Scouts, Brotherhood Week, Christmas Seals, 4-H Clubs, Flag Day, Girl Scouts, Heart Fund, Religion in American Life, Salvation Army, United Negro Colleges, and many other projects in the public interest.



You learned of the nurse shortage from ads like this, many contributed by daily, weekly and labor newspapers. In five years, 418,000 young women have responded.

We must increase productivity all along the line if we are to meet our defense needs and maintain a strong civilian economy. House magazines of leading companies carry ads like this regularly.

A PUBLIC SERVICE PROJECT
THE ADVERTISING COUNCIL

This advertisement is contributed by

R. J. Wadman

Editor—DIESEL PROGRESS

Diesel Engine Staying Power

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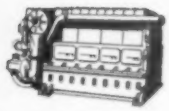

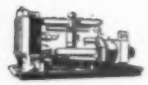

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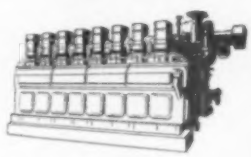

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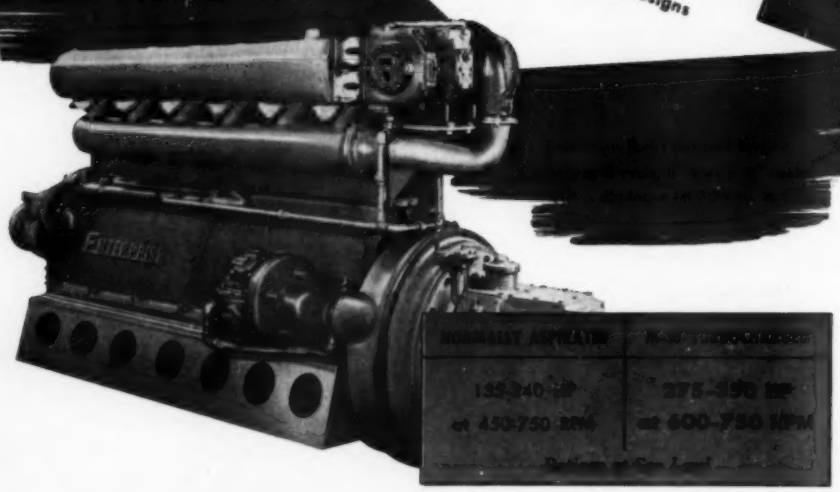

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THE "JEFFERSON" IS A GREAT SHIP

By DAVID I. DAY

THERE is scarcely on the inland waterways today a more imposing diesel vessel than the *Jefferson*. Launched nearly ten years ago at the yards of the Jeffersonville Boat & Machine Co., Jeffersonville, Ind., she has operated steadily and faithfully over the decade under the same name and for the same owner, the American Barge Line. She is a popular boat the length of the Mississippi as well as the length of the Ohio. As she approaches a landing or departs from it, there is a majesty in the appearance of this towboat that is rarely seen on the rivers.

The molded dimensions of the hull is 170 feet in length, 35 feet in width, and 9 feet in depth with a 16-inch shear at the bow, entirely minus the shear aft. The hull is framed with three fore and aft bulkheads and two fore and aft trusses. The bow is of the scow type with a false model shaped fin to roll logs and other floating obstructions away from the propellers. This arrangement has made it easier to cut ice in winter time. The stern is without tunnels. The towing knees are faced of 8-inch and 10-inch oak, with steel ribbing strips. Oak nosing, 6 inches by 8 inches encircle the hull, and this nosing is also faced with a similar steel strip. The *Jefferson's* big 500-lb. anchor of steel with the swinging boom crane on the various trips taken has attracted the attention of many persons not too well schooled in river ways. There are telescoped masts which lower when passing under low bridges and the like.

The main engines are Cooper-Bessemer twins, each with a 15½-inch bore and a 22-inch stroke. Each is estimated at 1000 hp. and most certainly delivers more. Each of the diesel engines is connected with an 8½-inch propeller shaft, driving a 4-blade Columbian Bronze propeller 74 inches in diameter with a 58-inch pitch. A Burgess snubber silences the main engine exhaust noise. A Viking lube oil scavenging and a good pressure pump are attached to each engine and can deliver 120 gallons per minute at 300 rpm. The scavenging oil pump forces the lube oil through two filters, through a heat exchanger into a storage tank. The pressure pump then takes over and forces the oil through another filter and into the engine. Fuel oil on this towboat is stored in four large wing tanks and one tank amidships. Two transfer oil pumps take the fuel oil from the tanks in the hull to the tank in the top of the engine room which supplies fuel as needed.

After the launching of this big workboat along in June, 1942 we saw her but infrequently and often at some distance for two or three years. We heard constant reports from river men from New Orleans to Pittsburgh and the reports were favorable. The boat had plenty of power. She handled easily for a craft of her size. She was comfortable and some of the men on her were certain no better place to eat and sleep had so far been devised. Then one pleasant cool October day in 1945 far up the Ohio not far, as we recall, from the head of Paden Island, some 130 miles below Pittsburgh we sat on shore and watched the *Jefferson* coming up along the island. Never it seemed to us was a towboat working easier considering the load in front. For she was hooked to a double lockage of loaded barges. There were six or seven heavy bargeloads of scrap, two or three of sulphur, one or two of cottonseed, and for full measure was also shoving a number of empty barges. The boat with many others on the river that afternoon were con-

Here is the mighty *M. V. Jefferson* especially posed for the picture—on the Ohio River.

tributing more than their share to the industrial supremacy of the upper river cities. From Paden Island to Wheeling about 40 miles motoring along Ohio State Highway No. 7, we saw a large number of diesel boats, large and small, passing up and down. There was a variety of river activities as we traveled upstream, the most interesting being the removal of sand and gravel from the river bed. Nearly all the work done there are diesel-engine jobs. No question about it—the development of the powerful, rugged diesel engine has revolutionized things in that vast coal and iron empire at the Ohio's headwaters.

In the meantime we have witnessed the *Jefferson* at work in various places and under various operating conditions. She was noted doing harbor work at New Orleans. She was pushing a tow in turbulent waters near the bridge at Greenville, Miss. She was going down by President's Island at Memphis, Tenn., with a flock of steel empties. She was rounding upstream into the mouth of the Ohio near Cairo, Ill. She was passing the riverside race track near Evansville, Ind. Always the engines were working smoothly, the huge propeller beating the river white as snow, the tows under complete control. Came August of 1950 and she came up past Alton, Ill., on the Father of Waters pushing a big tow of coal from the mines at Caseyville, Ky., to the homes and factories of Keokuk, Iowa. At various times she came steadily up by St. Louis without a mishap bearing the "black diamond" to the cities above. Those were the days when Capt. Lowell L. Sorrels was a new man with the American Barge Line. He was often in the *Jefferson's* pilot house those hot summer days. All along the Mississippi at every port may be found today good rivermen who will never forget the attractive appearance and the unfailing efficiency of this ABL towboat. Just recently back on the upper reaches of the Ohio we found the big boat headed upstream with ten or 12 barges of coal, oil, scrap, fluorspar, pig iron, sulphur, and maybe additional commodities. So smooth were her movements that everything was apparently automatic. And after she came back downstream, she was sent for repairs and a general check-up to the boat yards at Jeffersonville. There we observed her in late July, 1951.

There are three rudders forward of the propellers on the *Jefferson* and two aft. The forward rudders are handled by an hydraulic ram, of 8-inch diameter, with oil pressure applied at 250 pounds per square inch from a 10 hp pump. The aft rudders are the same except the ram is of 6-inch diameter. An automatic pressure switch holds the pressure constant. The pilot has control of the rudders at all times, the pilot house levers invariably placed at the same angle as the rudders. There are two generating sets, one of 40 kw., and the other of 60 kw. Each set has a Superior diesel engine and a Westinghouse generator. A Worthington air compressor (20 hp) and a Fairbanks-Morse air compressor (5 hp) take care of the four air tanks, installed forward in the mate's store space. They have a total capacity of 340 cubic feet of air at 300 psi. A 10 hp. Aurora centrifugal pump pumps the bilges and supplies the fire line.

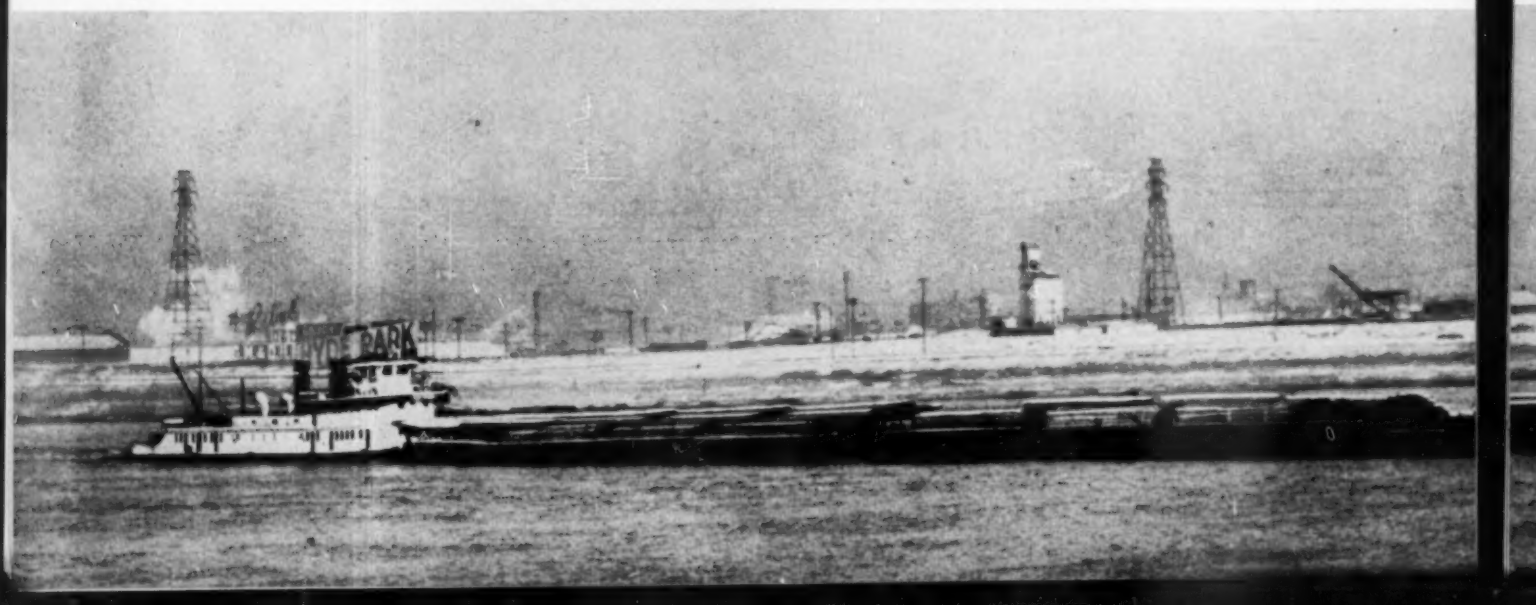
The propeller shafts drive two Dean Hill centrifugal pumps each with a capacity of 600 gallons per minute at a 60-ft head. They provide cool water circulating through the lube oil coolers, the main engine blocks, the generator engine blocks, and the ice machine. The jacket water is carried in a couple of sizable wing tanks aft of the engine room. A 3-hp Frick refrigeration machine was installed on the *Jefferson* and this makes the ice and handles two walk-in refrigerators. There is also a 9-ft. refrigerator in the galley for current small food items. The drinking water is from the city mains and carried in tanks in the stern and is filtered through a Hydrodarco purifier before use. When river water is used, it is thoroughly filtered. A 3 hp. Worthington centrifugal pump provides the proper pressure. There is also aboard a Hart galley range fired by a Ray oil burner. The capstans are from Schoellhorn-Albrecht.

While the boat is by no means identified in the public mind with the Illinois River, it has on occasion invaded that mighty stream with the low bridges. A year or so ago, for example, at the American Barge Line terminal at Joliet, far up the waterway, we observed unusual activity. The installation was virtually filled to the capacity. Cranes were busily swinging back and forth unloading rock phosphate for the local chemical concerns. Another crane set to work unloading another barge of some sort of rock product. The *Jefferson* seemed to be the "work-horse" in this case. A good deal of the material came from Homestead, Pa., for reshipment to Milwaukee. The big boat at the moment was reported downstream but coming up the river. Later in the day we saw her pushing up a double-lockage tow of various commodities—wire and nails among them. Boats were going from Joliet to Houston, to New Orleans and other southern points also. It is often said that the people of that Illinois city are not sufficiently appreciative of the Illinois waterway. They are overcoming that weakness very rapidly it appears. Coming off the Dravo ways soon is, indeed, a fine new diesel boat to be called the *City of Joliet*.

The main deckhouse on the *Jefferson* is 124 feet long. The cabins are steel framed and steel walled. The interior is of plywood. The floor has a fireproof plastic covering. The furniture is of maple and steel. Aft of the engine room on the main deck are the galley, the two messrooms, maid's room, cook's room, pantry, and refrigeration room. Forward of the engine room we find the rooms for the deckhands, for the striker engineers, for the mates, the laundry and the linen lockers. The officers' quarters are forward on the upper deck. All told, there are ample accommodations for 30 persons. The cabins are insulated and electric fans in summer are running everywhere needed.

Virtually all visitors aboard the boat are most pleased with the spacious pilot house. It is 14 x 16 feet in dimensions, with an inside stairway leading to the officers' quarters. The levers are invariably of interest, as they control the rudders, the flood lights, the searchlights, the guard lights, and the running lights. Especially are the big 19-inch arc searchlights atop the pilot house able to command attention. They can easily bathe the widest river and the willows along the shores in clear bright light under ordinary conditions. The boat has a modern lead line whistle and the standard airhorn for signaling purposes. The intercommunications system connects the pilot house and all other parts of the big vessel. The ship-to-shore radiotelephone equipment is in the pilot house.

A 40-mile pipe line riding the river. The *M. V. Jefferson* headed for Texas with 165 full carloads of 18-inch pipe. Photo taken as the big American Barge Line vessel approached St. Louis. In addition to 11 barges of pipe, the boat is pushing five barges of grain and steel. The Cooper-Bessemer diesels shoved the tow along at around 9 miles an hour.

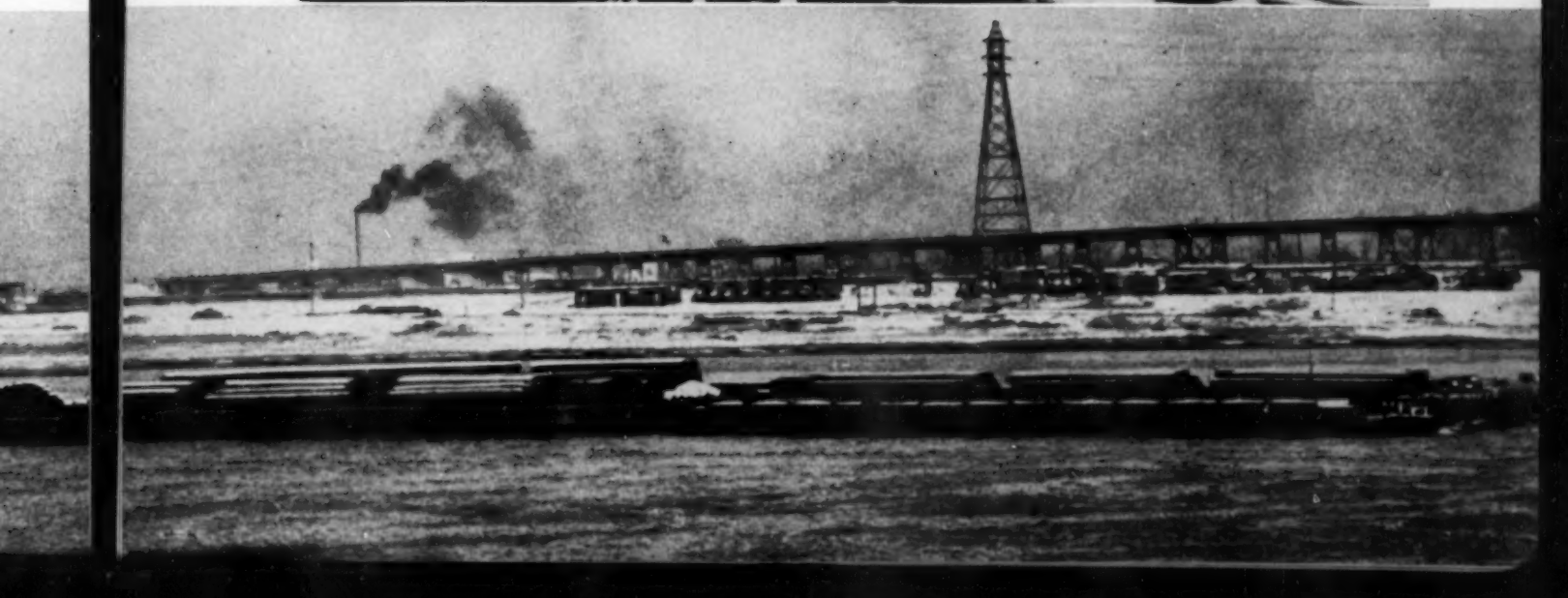


In a letter of July 15, an Ohio River pilot made a statement that bears second reading. Perhaps others caught a new vision of the future of river power when they visited or worked on the *Jefferson* when she was new. "The *Jefferson* has proven the last ten years that she is a remarkable work boat," he declared. "Incidentally she was the first boat to convince me that the day of steam power on the waterways was approaching its sunset. I never doubted for one minute afterwards that the day of the diesel vessel was brightly dawning."

List of Equipment

Main Engines—The Cooper-Bessemer Corp.
Propellers—Columbian Bronze Corp.
Circulating Pumps—Worthington Pump and Machinery Corp.
Drinking Water Purifier—Purolator Products, Inc.
Bilge Pumps—Aurora Pump Co.
Centrifugal Pumps—Dean Hill Company.
Diesel Generator Sets—National Supply Co.
Duplex Lube Oil Filter—Cuno Engineering Corp.
Filters—Michiana Filter Co.
Exhaust Snubbers—Burgess Battery Co.
Electric Capstans—Schoellhorn-Albrecht Machine Co.
Transfer Pumps—George D. Roper Co.
Heaters—Sims Company.
Heat and Oil Coolers—Ross Heater & Mfg. Co.
Fuel Oil Conditioners—American-Bosch Corp.
Generator—Westinghouse Electric Mfg. Co.
Electric Starter—Leece Neville Co.
Water Filters—International Filter Co.
Shaft Lubricators—Madison-Kipp Corp.
Pumps—Viking Pump Co.

Here is a photo of the Cooper-Bessemers in one of the noted engine rooms on the Inland Waterways.



Three International TD-18 tractors used with two Bucyrus-Erie S-122 scoops and one Heil C-10 scoop on a coal stripping operation by Carrier and Sons of Brookville, Pennsylvania. The units, shown loading in this view, remove the earth from the rock to spoil piles up to 100 yards distance, taking from 5 to 8 minutes for the round trip.

Ground must be test-drilled preliminary and during surface or strip mining. Borings help determine type of coal, thickness of seam and so forth. This operation is near Clarion, Pa.

DIESELS STRIP "BLACK GOLD" FROM EARTH

Mountains of Earth Are Annually Moved Aside to Get at About 100,000,000 Tons of "Black Gold" — and Diesels Play a Vital Role in Making Strip Mining Profitable

By WALTER RUDOLPH

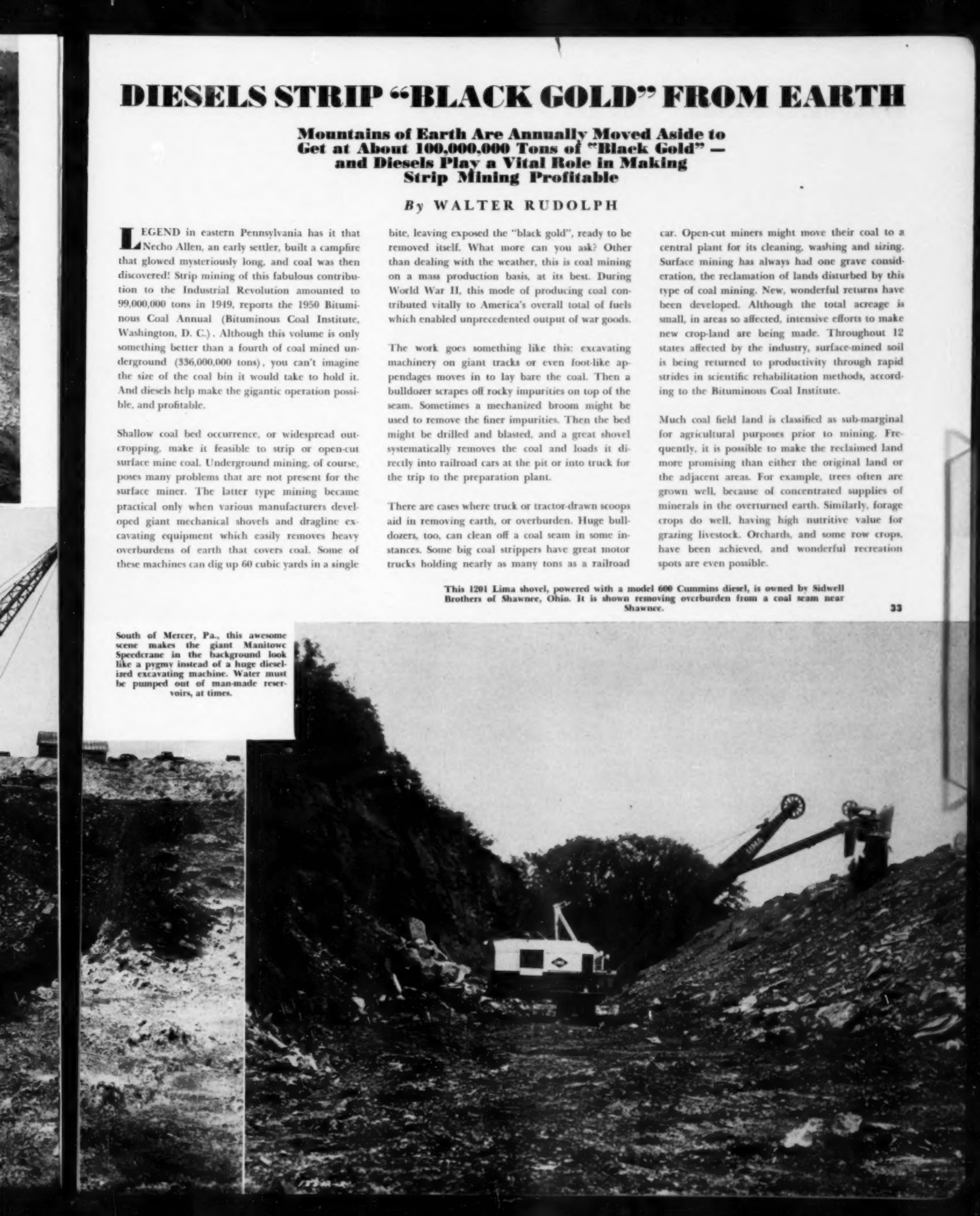
LEGEND in eastern Pennsylvania has it that Necho Allen, an early settler, built a campfire that glowed mysteriously long, and coal was then discovered! Strip mining of this fabulous contribution to the Industrial Revolution amounted to 99,000,000 tons in 1949, reports the 1950 Bituminous Coal Annual (Bituminous Coal Institute, Washington, D. C.). Although this volume is only something better than a fourth of coal mined underground (336,000,000 tons), you can't imagine the size of the coal bin it would take to hold it. And diesels help make the gigantic operation possible, and profitable.

Shallow coal bed occurrence, or widespread outcropping, make it feasible to strip or open-cut surface mine coal. Underground mining, of course, poses many problems that are not present for the surface miner. The latter type mining became practical only when various manufacturers developed giant mechanical shovels and dragline excavating equipment which easily removes heavy overburdens of earth that covers coal. Some of these machines can dig up 60 cubic yards in a single bite, leaving exposed the "black gold", ready to be removed itself. What more can you ask? Other than dealing with the weather, this is coal mining on a mass production basis, at its best. During World War II, this mode of producing coal contributed vitally to America's overall total of fuels which enabled unprecedented output of war goods.

The work goes something like this: excavating machinery on giant tracks or even foot-like appendages moves in to lay bare the coal. Then a bulldozer scrapes off rocky impurities on top of the seam. Sometimes a mechanized broom might be used to remove the finer impurities. Then the bed might be drilled and blasted, and a great shovel systematically removes the coal and loads it directly into railroad cars at the pit or into truck for the trip to the preparation plant.

There are cases where truck or tractor-drawn scoops aid in removing earth, or overburden. Huge bulldozers, too, can clean off a coal seam in some instances. Some big coal strippers have great motor trucks holding nearly as many tons as a railroad car. Open-cut miners might move their coal to a central plant for its cleaning, washing and sizing. Surface mining has always had one grave consideration, the reclamation of lands disturbed by this type of coal mining. New, wonderful returns have been developed. Although the total acreage is small, in areas so affected, intensive efforts to make new crop-land are being made. Throughout 12 states affected by the industry, surface-mined soil is being returned to productivity through rapid strides in scientific rehabilitation methods, according to the Bituminous Coal Institute.

Much coal field land is classified as sub-marginal for agricultural purposes prior to mining. Frequently, it is possible to make the reclaimed land more promising than either the original land or the adjacent areas. For example, trees often are grown well, because of concentrated supplies of minerals in the overturned earth. Similarly, forage crops do well, having high nutritive value for grazing livestock. Orchards, and some row crops, have been achieved, and wonderful recreation spots are even possible.



This 1201 Lima shovel, powered with a model 600 Cummins diesel, is owned by Sidwell Brothers of Shawnee, Ohio. It is shown removing overburden from a coal seam near Shawnee.

South of Mercer, Pa., this awesome scene makes the giant Manitowoc Speedcrane in the background look like a pygmy instead of a huge dieselized excavating machine. Water must be pumped out of man-made reservoirs, at times.

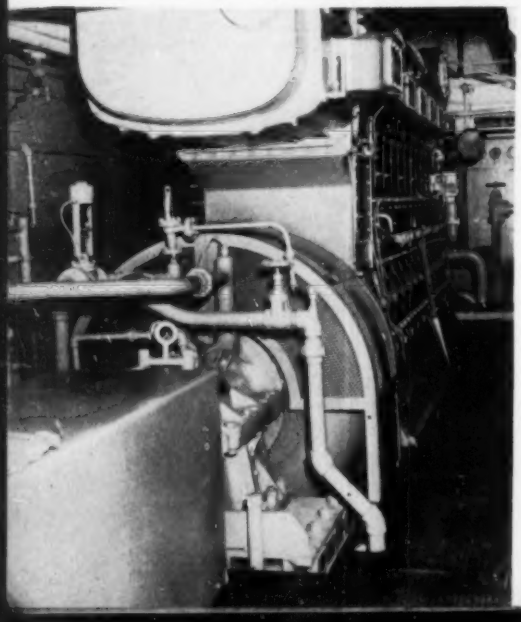
DIESEL SHIP "R. H. McElroy"

By DAVID I. DAY

ON July 1, 1950 we saw the new *R. H. McElroy* passing Joliet on the Illinois Waterway enroute to active service for her owners, the Pure Oil Company of Chicago. At that time all the rivermen in Joliet territory expressed themselves freely that this towboat would shortly prove herself one of the best of all time. After more than a year of grueling service the length of the Mississippi and the length of the Ohio, this prediction has been found true in every respect. Few, if any, of the modern crop of river work boats have moved more petroleum products over more miles at less cost or with less trouble. Some months later we saw the boat emerging from Lake Pepin, a widened part of the upper Mississippi below the Twin Cities. She was pushing up to Minneapolis from the deep South one of the biggest oil tows seen on the Father of Waters. She was handling the tow with ease. And was running ahead of schedule by several hours.

In August, 1951, we saw the *McElroy* far up the Ohio passing under the bridge at Wheeling, West Va. She was making fine time back of her regular tow of 80,000 barrels in four special barges. She was reported to have made a fast and trouble-free trip all the way up from the Texas Gulf Coast. A news report later indicated she had maintained her rate of speed all the way to Pittsburgh. (A good many times this year we have had reports on the *McElroy* pushing excess loads up to 12,000 tons in all sorts of weather and under all sorts of river operating conditions.) A recent letter from Peoria, Ill., on the Illinois River says: "My opinion is the *R. H. McElroy* is one of the great towboats of today. My conviction on this point was reinforced in June when she passed here from Baton Rouge and Port Allen, La., with four barges, 9000 tons of petroleum products, going all the way up to Chicago. I never saw a boat of any size handling a tow of that size any easier or any faster. She made her entire journey in ten days—1375 miles at a rate of nearly 6 miles an hour."

A pair of Fairbanks-Morse O-P diesels rated at 3200 hp. at 720 rpm. drive the *R. H. McElroy*.



This boat was designed by David R. DeLay, naval architect, Sturgeon Bay, Wis., where she was built by the Sturgeon Bay Shipbuilding & Dry Dock Company. The name was given in honor of Robert H. McElroy, vice-president in charge of marketing for the Pure Oil Company. Painted white, trimmed in blue, the vessel has borne proudly the colors of the owning company the length of the inland waterways. We might add that Anker L. Christy and Walter F. Hagestad of Pure Oil were consulted regularly by the architect in the planning of the boat. She is a twin screw vessel with what is called the "Modified V" type of welded steel hull, 118 feet in length, 45 feet in beam, and 11 feet in molded depth. The normal draft is about 7½ feet. In one respect, practical rivermen are agreed—the hull strength of the *McElroy* compares favorably with that of any steel towboat on any river. The builders evidently took special pains to make her carry maximum longitudinal strength the full length. The hull is framed transversely with five watertight bulkheads. The boat is thus divided into six main watertight compartments.

The speed and power of the *R. H. McElroy* with her comparatively trouble-free performance over the months have aroused the invariable interest of visitors in her neat engine room. There they see the two opposed piston, 10-cylinder, 2-cycle Fairbanks-Morse diesel engines. Combined they add up to 3200 hp at 720 rpm. American Blower hydraulic couplings and Universal reduction gears carry the power to the propeller shaft. The two 84-inch Coolidge steel propellers are operated from the pilot house utilizing Westinghouse controls.

There are two centrifuges, one for lube oil and the other for fuel oil. Arrangements are provided for the reclamation of lube oil either by the batch method or by a continuous process. The engines have separate pumps with the oil circulating freely through adequate strainers, coolers, and filters. As one St. Louis marine engineer of more than 25 years of experience stated on Aug. 28: "The engine room on the *McElroy* is proof of the efficiency of the engines and a tribute to the men who planned and built this superb vessel."

Wentworth Hayne, reporting in late August from New Orleans, mentioned the *McElroy* upbound at the Greenville, Miss., bridge. The current is swift there and in times past has caused trouble and even led to tragedy. The whole stretch of channel there is described as "extremely treacherous." Yet he says the *McElroy* pushed up the four barges with "possibly 10,000 tons" and indicated very little difficulty. "You have to have real engines to turn the trick," he declared, "and there must be the right fellows in the engine room."

When one sees the big engines swiftly and smoothly running, it is easy to believe the Hayne report and many others in like vein. We will say that engine temperatures are controlled efficiently on this craft by a dual system. The skin cooling and heat exchange ideas are both in use. Channels on the bottom of the boat cool the engine circulating water. The lube oil is cooled by Harrison

heat exchangers, two on each engine. They are placed in parallel with a water circulating pump for each pair of coolers. There is a "before and after" water cooling pump which is operated from the lube oil manifold. When the throttle is closed, the pump starts automatically handling approximately 35 gallons a minute.

The engine room is not merely neat and well arranged but is well-ventilated. For ventilation, a pair of blowers are in use, each handling around 3500 to 4000 cubic feet a minute. Some think this rating is below actual performance. The blowers were manufactured by the American Blower Corporation.

Twin General Motors diesel generator sets with Westinghouse generators take care of all auxiliary power needs of this boat. Each delivers about 100 kw, 440 volt, 3-phase alternating current. On the shaft of each unit is a 20 kw, 120-volt dc generator. The direct current equipment is for the searchlights, for battery charging, and like chores. We can testify freely to the brightness from the Carlisle & Finch searchlights on the *McElroy*. Especially when seen on the upper Ohio where high hills flank the comparatively narrow river.

Much comment has been made orally and in print the last year or so regarding the high maneuverability of the vessel, especially with her present 4-barge arrangement. She is regarded as easily steered and is singularly free from over-responsiveness to

the effect of under-water movements and force. As one man said: "The *McElroy* is like some automobiles—much easier to take where you want to go than are some others." The steering gears are electric-hydraulic, designed and built by the Sturgeon Bay shipyard, using two hydraulic screw-type pumps from the Sier-Bath Gear & Pump Company. There are 4-way valves and Westinghouse controls. These pumps are rated at 75 gallons per minute with 250 pounds pressure. There are separate gears for steering and flanking. The rudder angles are indicated correctly in the pilot house. There are six rudders, two for steering and four for flanking, all made by Struthers-Wells.

In checking the *McElroy's* engine room, it is well to notice the provision for fire fighting. There are

several hand-type carbon dioxide bottles within convenient reach. There are hose reels and other fire protection items. The two fire pumps are 2-stage 200 gallons per minute at 100 lbs pressure, both driven by 20 hp motors. Educators are off the fire main to pump the bilges and ballast discharge. Forward of the main engine room is the engineers' shop with all sorts of repair tools, including also modern lathes, presses, grinders and bins for parts storage. The boat is well heated with steam using a Kewaunee boiler. The machinery and bulkheads were painted gray with the floors of a red tint, this color scheme extended throughout the interior. At the base of the mast which is located aft, a couple of 3000-lb. capacity Manning, Maxwell & Moore hoists are in use. There are Goodrich Cutless Rubber bearings at the strut end of the tern tubes.

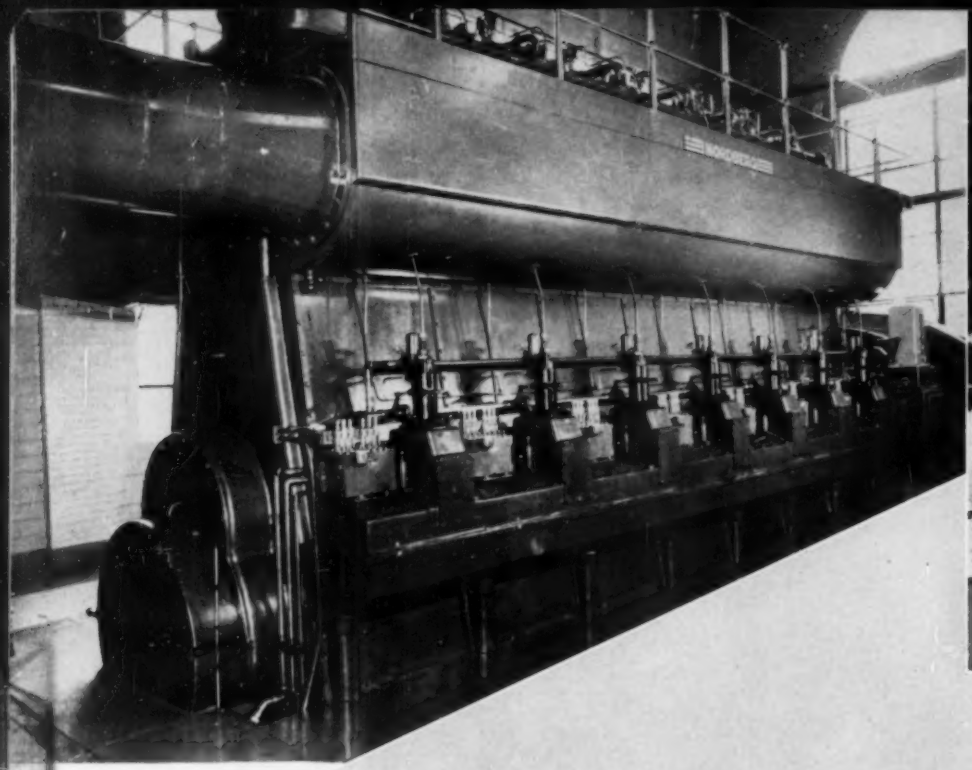
Next to the engine room, the *McElroy's* pilot house is the most interesting part of the boat to the river visitors. It is very spacious and comfortable, with vision ample in all directions. In addition to the steering control stand, there are the public address system, the radio-telephone, the intercommunicating system, the radar equipment, and, of course, the searchlight controls and the engine controls.

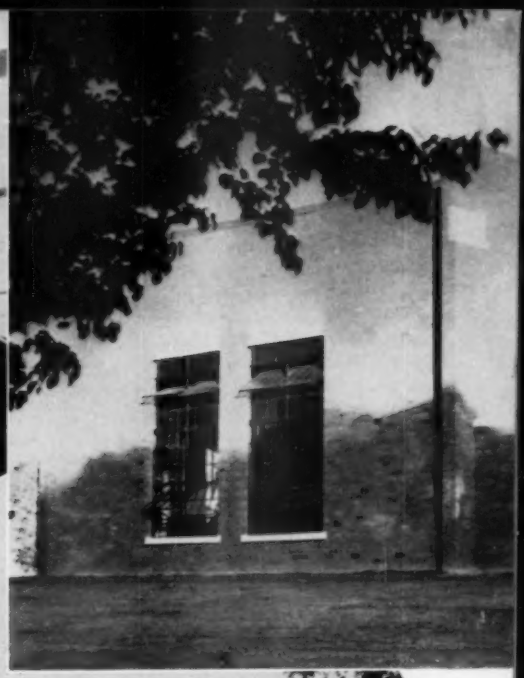
There are ample quarters for 20 men on the main deck. The quarters of captain and owners are on the texas deck. Forward is a neat and well-furnished lounge. The boat has plenty of inside passageways

Blue and white motor vessel *R. H. McElroy* of the Pure Oil Company's river fleet on the Mississippi, with four barge tow load. The *McElroy*, 118 feet in length and 45 feet in beam, has a modified V-bottom hull. The vessel is powered with two 10-cylinder Fairbanks-Morse engines, and is one of the most powerful towboats on the Mississippi and Ohio River Systems.

which render going outside unnecessary in bad weather. The galley is complete in all respects. It has a Hotpoint electric range, York compressors to insure refrigeration. A lot of the galley equipment is of stainless steel. The dining area is starboard of the galley and seats 12.

At the present time, Capt. Duncan R. Hadley is in command of the *McElroy* with A. R. Patterson as chief engineer. These men are efficient and widely known rivermen who not only know how to operate the boat but how to appreciate it. In every respect, this is a fine towboat and one of the features appreciated by the officers in charge is the fuel oil capacity—86,000 gallons or sufficient for 20 days' running on the yellow rivers.



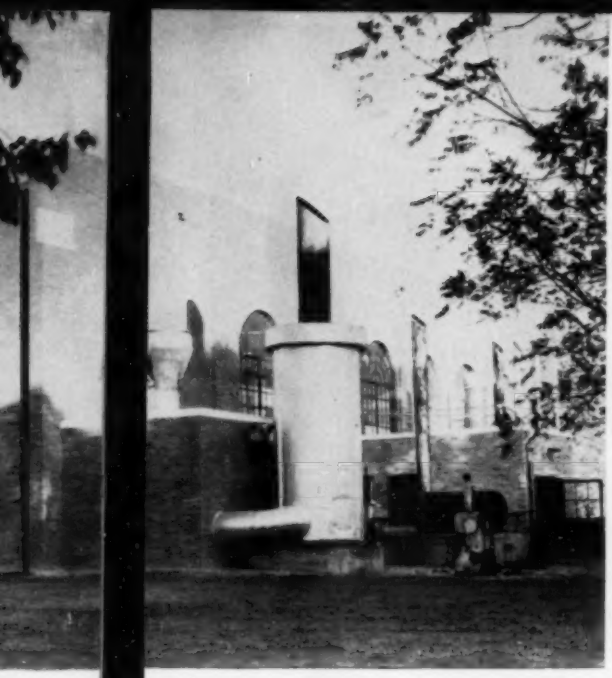


The Pierre municipal power plant houses five diesels totaling 7,500 hp. Diesels have supplied all light and power for the capital of South Dakota since 1931.

PIERRE, SOUTH DAKOTA

Capital of South Dakota Adds New Nordberg to Its Municipal Plant to Accommodate Large Population Influx

By ROY B. BAKER*



Exhaust gases of the 3,000 hp. Nordberg engine vent through the Maxim silencer in the foreground. In winter, scavenging air is drawn from the jacket around the silencer. The brick air chamber houses an impingement-type American air filter.

Top, right: This view of the 3,000 hp. Nordberg engine, newest and largest engine in the Pierre plant, shows the American Bosch fuel pumps, the Manzel cylinder lubricators and the Woodward governor.

PIERRE, capital of South Dakota, is a city with a ten-year problem. Located on the east bank of the Missouri River, the city is near the site of the giant Oahe dam on which work was started in July 1950 and scheduled for completion in 1960. Already expanding at a better than normal rate, the dam project brought Pierre a swift influx of population. The city grew 32 per cent between the 1940 and 1950 census counts with a large portion of the increase concentrated in the last year or two. Business and residential building boomed. Within six months, the city boasted a new hotel, new restaurant, new supermarket and other stores. Farsighted municipal officials moved rapidly to provide essential services to the expanding population. In 1949 and 1950, the city erected two new fire stations, completed a street-widening program, installed mercury vapor street lights, built a 1,500,000 gal. reservoir, built new water mains, and put in a new airport lighting system.

Expansion was equally essential at the municipal power plant where load was soaring above firm capacity, with every indication of continuing growth. There would be plenty of hydro power available in 1960 when the Oahe dam's 140,000 kw. generators started turning but for the next ten years the load would have to be carried by the Pierre municipal diesel plant. The city needed a large engine, capable of handling a heavy operating schedule for ten years with all possible efficiency and dependability. At the end of that period, sound power policy dictated maintenance of an adequate standby plant.

Pierre officials decided to install a heavy-duty diesel and chose a 3,000 hp., seven cylinder, 21½-in. bore by 31-in. stroke, trunk piston, two-cycle, mechanical injection Nordberg diesel developing rated horsepower at a moderate 225 rpm. This unit went into service on Dec. 20, 1949, and immediately started on a program of efficient power generation. In 1950, the first full year of operation, the Nordberg diesel ran a total of 4186 hrs. and produced 5,029,000 kwh. of the plant's total of 10,004,400 kwh. During this period, the new 3,000 hp. unit consumed 359,751 gal. of fuel, a notable average of 13.978 kwh. per gal. In producing the remaining 4,975,400 kwh., the plant's other diesels consumed 430,511 gal. of fuel for an average of 12.66 per kwh.

Table I gives the detailed operating data for each of the last five years, including department revenues, itemized generating expense, costs of distribution, street light maintenance, commercial department, general and depreciation. It will be seen that net profit in 1950, after deduction of the allowance for depreciation, was $100,845.39. Though this was by far the largest profit in its history, the plant has been consistently profitable with a five-year net of $324,593.07. In the past decade, the electric department has turned over to the city more than $500,000.00 for use in the general fund and payment of general city obligations.

Pierre has had a municipal power plant since 1911 and the present plant dates back to 1931 when two 750 hp Fulton air-injection diesels were installed. A 1,000 hp. solid-injection Worthington was added in 1935 and a 2,000 hp. solid-injection Fulton in 1946. Then in 1949, the city switched to two-cycle diesels with the installation of the 3,000 hp. Nordberg engine. The big engine drives a 2100 kw., 4160-volt generator with chain-driven exciter. All the rest of the plant operates at 2300 volts. Scavenging air for the two-cycle diesel is supplied by a high-speed rotary blower driven by a 250 hp. electric motor.

Power for this motor is provided through a direct line to the engine's alternator. A battery set forces the generator field and insures a quick surge of power when the generator begins to turn. Air is cleaned by a 20-cell impingement-type filter in a chamber in the blower room. In summer, the air is drawn directly through a pipe that extends through the roof. In winter, air is warmed in a jacket around the exhaust silencer.

All the diesels burn a Wyoming fuel oil of 25-26 gravity. Delivered by tank car, the oil is transferred by a motor-driven unloading pump to four 20,000 gal. underground storage tanks. Float-controlled motor-driven pumps move the oil from storage to a 500 gal. tank in the engine room after which the fuel flows by gravity to the 200 gal. day tanks in the basement. Engine-driven supply pumps pick up the oil from the day tanks through individual meters. One of the little transfer pumps has handled nearly 400 carloads of oil. Steam heat is needed to permit unloading the viscous fuel in cold weather and two of the storage tanks also are equipped with steam heating coils. A waste heat boiler in the exhaust system of the 2,000 hp diesel provides steam for this purpose and is supplemented when necessary by a small oil burner.

A detergent oil is used to lubricate the big engine. SAE 40 lube is fed to the cylinders by individual mechanical lubricators while SAE 30 oil is circulated to the bearings and to the pistons (as a coolant) by an engine-driven pump. A shell-and-tube oil cooler is included in this circuit. A motor-

*City Engineer, Pierre, S. Dak.

List of Equipment For The 3000-hp. Nordberg Diesel

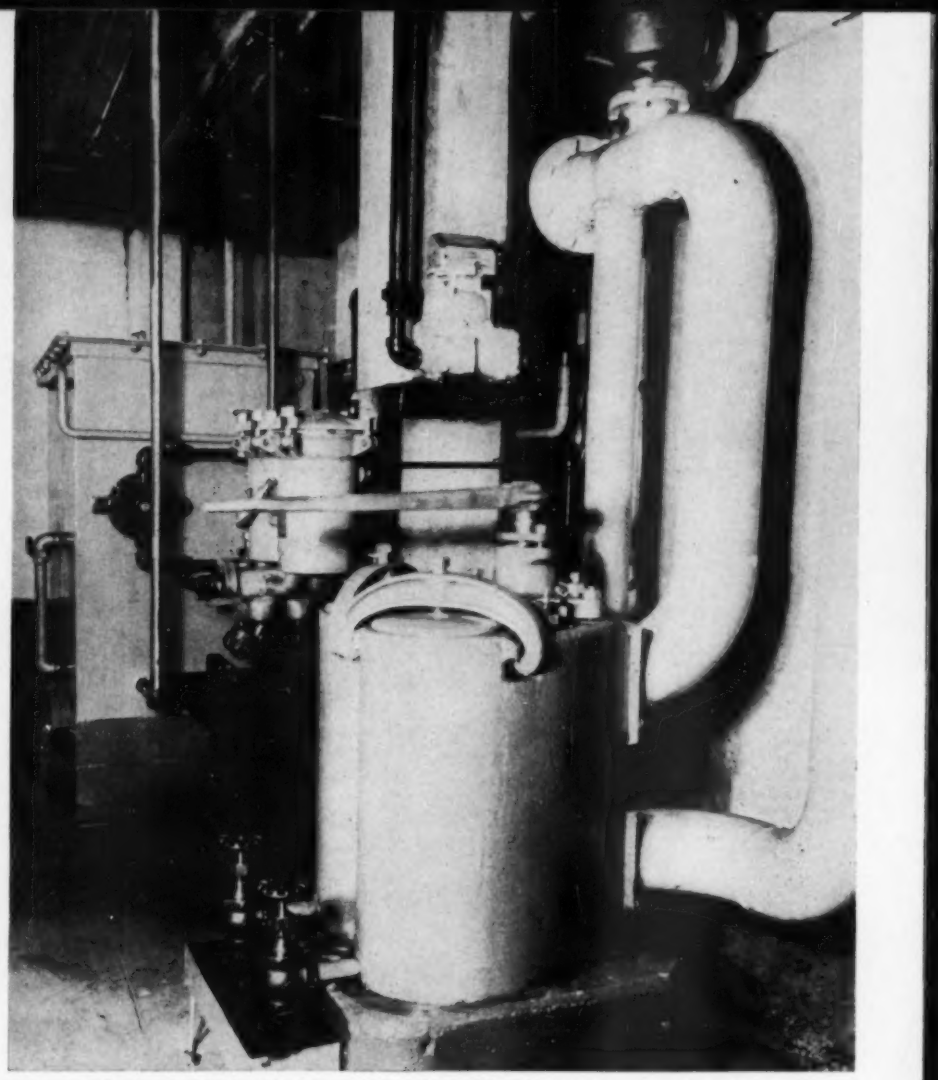
Engine—One seven cylinder, trunk piston, two-cycle, 3,000 hp mechanical injection. Nordberg.
Generator—One 2100 kw, 4160 volt, 30 kw exciter. General Electric.
Blower—250 hp motor-driven high-speed rotary blower.
Battery set—Gould Co.
Governor—Woodward Governor Co.
Fuel oil—Ohio Oil Co.
Transfer pump—Viking Pump Co.
Fuel meters—Pittsburgh Equitable Meter.
Fuel filter—Wm. W. Nugent & Co., Inc.
Lube oil—Standard HD. Standard Oil Co. (Ind.)
Lube filter—Briggs Filtration Co.
Lube oil cooler—Ross Heater & Mfg. Co., Inc.
Cooling tower—Diesel Service Co.
Air filters—American Air Filter Co., Inc.
Silencer—Maxim Silencer Co.
Alarm panel—Viking Instruments, Inc.
Pyrometer—Alnor. Illinois Testing Lab., Inc.
Switchboard—Westinghouse Electric & Mfg. Co.
Fuel pumps—American Bosch
Cylinder lubricators—Manzel Inc.

driven auxiliary lube pump serves as a b. and a. pump and also is arranged to start automatically if the main pump fails. Oil is drawn from the sump continuously by a motor-driven pump and put through a 20-element cellulose filter, then returned to the sump. Filter elements are changed every 2,000 hours. An inspection after 4,000 hours of operation showed the engine to be perfectly clean. Needless to say, the lube itself is checked more often and found to be in excellent condition.

Jacket water for the three largest engines is circulated through coils in a 5,000 hp forced draft cooling tower which has fans automatically controlled to maintain the desired water temperature. Four 600 gpm motor-driven centrifugal pumps handle the jacket water and three similar pumps circulate the raw water for the tower. Make-up water is drawn from the city mains and treated with chemicals. A gauge board beside the Nordberg holds an exhaust pyrometer and pressure and temperature alarms on cooling water, engine lubricating oil and blower lube. There are also push button switches for control of auxiliary equipment.

All through 1950, the plant built toward a production of 1,000,000 kwh a month and finally topped that mark in January 1951. Production for 1950, totaled 10,004,400 kwh. Fuel consumption was 790,399 gal. for an average production of 12.65 kwh per gal. As the growing load permits operation of the new unit at a more favorable load factor, it is expected that it will improve the plant efficiency average. But even at present fuel consumption levels, Pierre is turning out power at a substantial profit.

The plant has been fortunate in the quality and continuity of service of personnel on both the operating and policy-making levels. Chief Engineer Sam Van Hise has served in the plant since diesels were first introduced in 1931 and has occupied his present post for ten years. In addition to his primary contribution in directing the efficient operation of the plant, Mr. Van Hise has rendered valuable service by designing special tools and machines to facilitate and improve maintenance work. The plant's machine shop does a wide variety of jobs for the city, even fabricating the 21,000 gal. fuel storage tanks. Your author, City Engineer Roy Baker, is another official with a long record of public service. On the policy level, top official is Mayor John B. Griffin who has been in office through the major expansion of the plant. He is assisted by the four city commissioners, C. B. Mateer, Don A. Sheppard, Jack D. Spargur and G. E. Thoreson. Mr. Spargur is Utilities Commissioner. F. S. Wilkes is superintendent of the Electric Department.



Serving the 3,000 hp. Nordberg engine are, left to right, the lube oil sump, a Viking fuel transfer pump, a Duplex Nugent fuel filter, a Pittsburgh Equitable fuel meter and a Nordberg lube screen.

TABLE I
Operating Data for Last Five Years

	1946	1947	1948	1949	1950	Five-Year Total
Total Revenues	$152,965.23	$173,566.41	$207,366.21	$262,685.44	$302,508.64	$1,099,091.93
Production Expense						
Supt. & Labor	21,642.38	22,679.25	29,015.42	31,877.73	34,698.04	318,261.65
Fuel & Lube	31,121.27	44,950.81	75,414.91	76,517.11	90,257.55	318,261.65
Water	3,147.82	4,199.74	4,580.65	960.85	347.77	13,236.83
Supplies & Misc.	1,572.64	2,481.49	4,033.68	5,854.57	4,143.62	18,066.00
Maintenance	4,524.75	8,125.40	7,971.11	9,629.64	8,037.57	38,288.47
Total Production	62,008.86	82,436.69	121,015.77	124,819.90	137,484.55	527,765.77
Distribution	9,283.63	10,698.92	13,008.11	18,237.45	11,592.68	62,820.79
St. Light Maint.	1,662.45	1,052.48	1,854.73	3,605.56	2,086.31	10,261.53
Gen. & Depreciation	17,560.33	17,929.32	29,759.89	35,218.40	44,555.18	145,023.12
Commercial	4,764.53	4,811.78	6,585.48	6,521.33	5,944.53	28,627.65
Total Operating	95,279.80	116,929.19	172,223.98	188,402.64	201,663.25	774,498.86
Net Profit	57,685.43	56,637.22	35,142.23	74,282.80	100,845.39	324,593.07
KWH Generated	5,288,400	6,302,600	7,299,700	8,571,100	10,004,400	37,466,200

SPECIAL PURPOSE TRACTOR-TRAILER UNITS

This Enterprising North Carolina Trucker Builds Them to His Own Specifications for His Own Transportation Needs

By DOUGLAS SHEARING

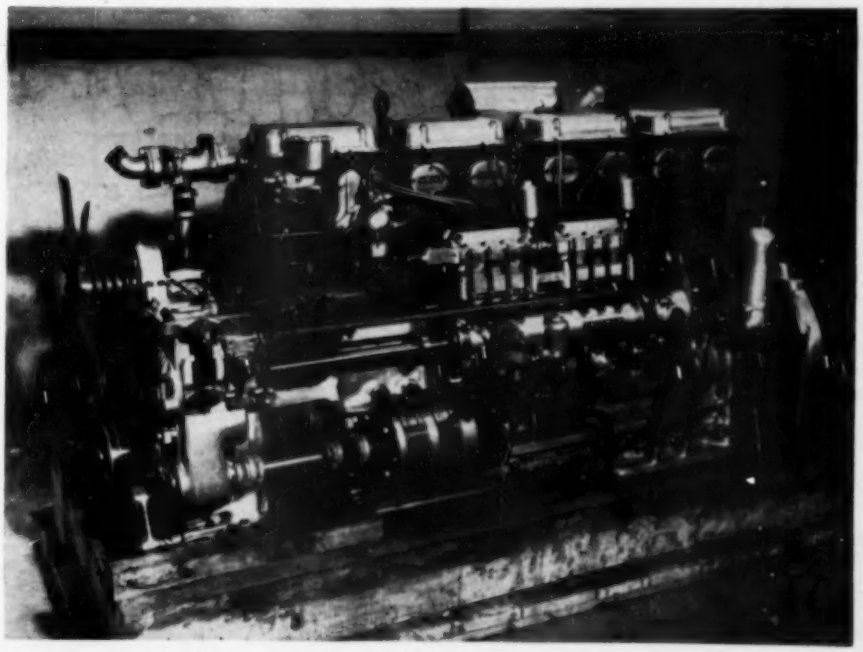
MORE and more, equipment built for a specialized hauling job is becoming the rule rather than the exception on the nation's highways. As the type of material to be carried becomes more specialized, trucking firms are turning to road equipment of particular design in order to obtain the most efficient and economical unit that will do their job.

For those highway carriers who transport specific types of commodities only, this has become a necessity. Turner Transfer, Inc. of Greensboro, N.C., an organization which concentrates on the transportation of machinery used in the manufacture of textiles, is turning to unusual tractor-trailer combinations of their own design. Using an imported English engine and an especially designed cab, they are achieving an economy of operation they had not enjoyed before. The engine is a 680- cu. in. Gardner diesel, an in-line 8-cylinder model which features an aluminum crankcase and develops 175 hp. at 1700 rpm. The engine weighs 1,850 pounds. Oil change is from 4,000 to 6,000 miles on detergent oils with a base overhaul period estimated at 140,000 miles. The diesel also features an air-cooled oil cooler. The unit pictured is a 6 by 2 drive model with a Turner-designed trailing axle.

The cab was designed to give the driver a better view of traffic approaching from either direction. With an eye-level of ten feet, it places the driver's position as far to the left as possible, permitting comfortable seating for four men. It provides a sleeper bunk under the hood and inasmuch as the driver's seat is separate, a second man can sleep on the front seat. Hydraulic tilting of the cab makes for easy accessibility to the engine and its components for servicing.

The first model put into service has been hauling gross loads of 52,000 to 72,000 pounds all over the eastern part of the United States and Canada, delivering 8.8 miles per U. S. gallon of fuel. This includes two or three hours of winching at each end of the line. Mr. Guy M. Turner, president of the organization, believes that this mileage will increase with some improvements they are contemplating. Mr. J. D. Dempster, who was connected with Gardners, Ltd., of Canada in the capacity of engineer, is at present with the Turner firm as superintendent of motive power and will have charge of engineering on their conversions. The change-over from gas equipment is proceeding as quickly as possible.

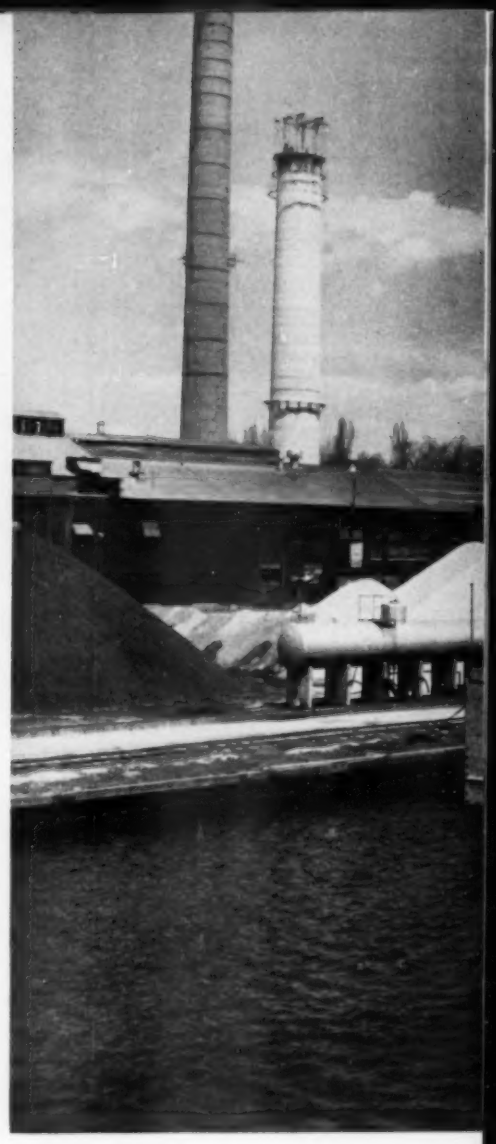
The original 6 by 2 unit and the subsequent nine 4 by 2 drive units were built by the Corbitt Motor Truck Company on special order by Turner Transfer, Inc.



THE "J. B. JOHN" CEMENT FREIGHTER

New Fairbanks-Morse Diesels and Improved Loading and Unloading Facilities Permit Addition of 60 Trips To Annual Schedule

By M. L. BOLOTIN*



THE diesel vessel *J. B. John*, cement carrier owned and operated by the Manitowoc Portland Cement Company, has increased its annual work schedule a full 83 percent as a result of the installation of two new Fairbanks-Morse diesels and improvement of loading and unloading facilities both on the ship and at the docks. Based on the performance of the freighter this year, the owners plan for 1952 an additional 60 trips totaling 13,350 miles. The heavier work schedule obviously means a vast increase in the vessel's earning power. In addition, the new engines are returning a substantial dividend in operating economy. It is calculated that, even at the 1950 level of operations, the new diesels will save 4,500 gal. of fuel oil and 1,500 gal. of lubricating oil.

The *J. B. John*, originally the *Daniel McCool*, was built in 1926 by the Manitowoc Shipbuilding Company for Great Lakes service as a self-unloading cement freighter. Her overall length is 152 ft., her length beam perpendicular 144 ft., her beam molded 33 ft. and her depth 15 ft. The vessel's cargo capacity is 4,200 barrels of cement, each barrel weighing 376 lb., a total pay load of nearly 790 short tons. Fully loaded, she draws almost 13 feet of water. Originally the vessel was powered by two 4-cylinder, 14-in. by 17-in. Fairbanks-Morse Type "CO" crankcase scavenging diesels, each developing 240 bhp. at 250 rpm. Each engine drove, through a friction-type clutch, a 3-blade propeller of 67-in. diameter and 54-in. pitch with a total developed area of 1,512 inches. In addition, each diesel drove a 160-kw. Fairbanks-Morse alternator.

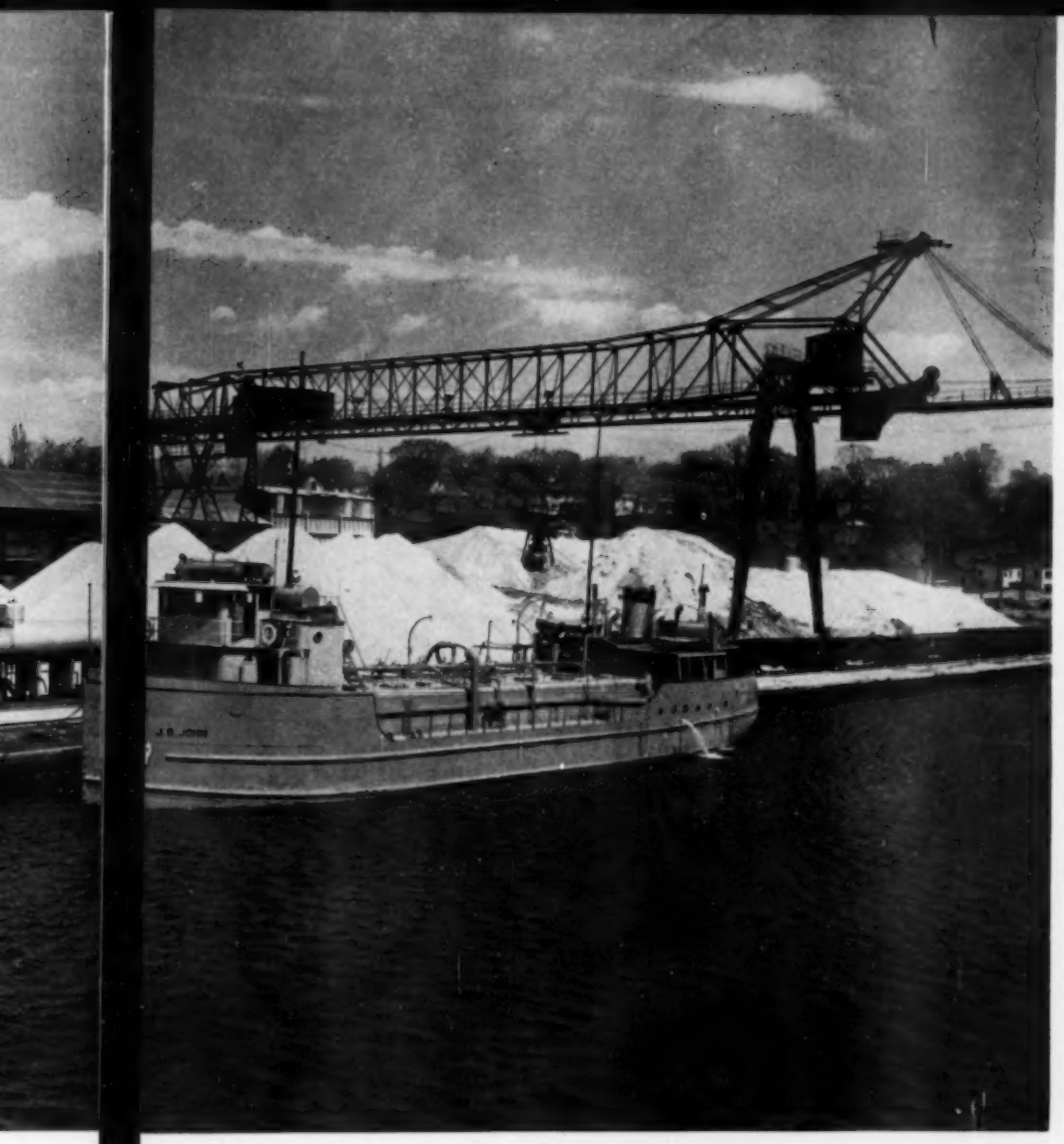
With this equipment, the freighter served 24 years, working steadily throughout the season from the first week of May to the middle of December. The vessel hauls cement from the company's plant at Manitowoc, Wisconsin, to the company's silos at Milwaukee, Wisconsin, and Holland, Michigan. In the 1950 season, the vessel completed 68 round trips to Milwaukee, a distance of 150 miles for each round trip, and 24 round trips to Holland, a distance of 240 miles for each round trip. Usually there is no cargo for the return trip.

At the close of the 1950 season, the Manitowoc Portland Cement Company made an investment in speed and maneuverability to increase the earning power of the vessel. After 24 years, the old engines were still in excellent operating condition for their age and years of service but they were outdated and their maximum speed would produce a top speed of only 8 miles per hour. More power meant more speed, more trips per season and more profit for the owner. In December, 1950, the *J. B. John* went into dry dock at the Manitowoc Shipbuilding Company yards. The old engines were removed and in their place were installed two 6-cylinder, 8½-in. by 8½-in., Fairbanks-Morse model 31AM8½ marine-type, pump scavenging diesels. These "enbloc" engines are rated at 330 bhp. each at a speed of 514 rpm. Bmep. is 63.5 and piston speed 1004 ft. per minute. Each engine drives a new three-blade bronze propeller at 267 rpm. through 1.97:1 F-M reduction gears with Airflex clutches. The new wheels were designed by Prof. Louis A. Baier, naval architect, University of Michigan. In operation they have performed perfectly and met every expectation. Powered from the front end of the diesels, through Poole flexible couplings, are two 200 kw., 3-phase, 60-cycle, 480-volt Fairbanks-Morse alternators with top-mounted, belt-driven 5 kw., 1750 rpm exciters. The alternators are driven at engine speed of 514 rpm. Just as the new engines were necessary to increase speed and maneuverability, the larger alternators were essential to handle the new, larger, faster loading and unloading equipment. The old switchboard was retained but new voltage regulators were installed.

The installation of engines and other equipment, with Fairbanks, Morse & Co. as consultants, was completed in the off-season and the vessel was ready for its first trial runs the first week of April. Overall improvement was immediately apparent. On April 11th, the first full load (4,200 barrels of cement) was hauled to Milwaukee and 50 minutes were cut off the best previous running time.

On April 20th, the vessel made its first round trip to Holland, Mich., and cut five full hours off the best running time ever recorded. In consistent performance thus far this year, the vessel travels at a top speed of more than 10 mph. fully loaded, an increase of more than 2 mph., and does even better on the light return trips. The average loaded running time from Manitowoc to Milwaukee has been cut from 8½ to 7½ hours. Average time for the Manitowoc-Holland round trip has been reduced from 36 hours to 31 hours. Increased speed is only one of the factors in the vessel's improved performance. Operating personnel and company officials also have high praise for the improvements in maneuverability. Manitowoc Cement lays its plans well in advance and already has tentative schedules set for 1952. The company's general expansion program includes greater production capacity at Manitowoc and reactivation of storage silos at Chicago. Because of these factors, the in-

*Field Engineer, Fairbanks, Morse & Co.



creased speed of the *J. B. John*, and the new loading and unloading equipment, the company has scheduled 25 additional trips to Milwaukee, 15 additional trips to Holland, and about 20 trips to Chicago. This will add 60 trips totaling 13,350 miles to the previous 92-trip, 15,960 mile schedule, a tremendous 83 percent increase.

Data available at this writing shows that the new engines are consuming less than .390 lb. of fuel per brake horsepower-hour and are running better than 3,000 rated hp. hr. per gallon of lubricating oil. A conservative estimate indicates that the new diesels will save approximately 4,500 gal. of fuel oil and 1,500 gal. of lube in 1951 traveling the same number of miles covered with the old engines in 1950. Each engine has two built-in reversible centrifugal water pumps, one for jacket water and the other for lake (raw) water. In addition, a single 180 gpm. motor-driven after-cooling pump is used to circulate jacket water through the engines during their few non-operating hours. Jacket water for each engine is cooled in a separate heat exchanger and temperatures are maintained by individual 3-way automatic temperature regulating valves which by-pass jacket water around the heat exchangers. Oil is cooled by other separate heat exchangers and temperatures are maintained by regulating valves which by-pass oil around the coolers. The oil is circulated through each engine under pressure by individual built-in reversible lube oil pumps. The oil is continuously filtered and strained by an individual filter and strainer for each engine. Hand operated pre-lube pumps, one per engine, are used for pre-oiling.

The ship has a total fuel oil storage capacity of 10,200 gal. in four 2,500-gal. each 4 ft. 6 in. by 21 ft. 6 in. tanks. This is enough fuel oil for more than one and a half weeks of continuous operation with the new engines. A motor-driven rotary fuel oil transfer pump brings the fuel from the storage tanks to a 400-gal. day tank from which it is pumped to each engine by separate built-in rotary fuel oil pumps. Hand-operated fuel oil pumps, one per engine, are used for building up fuel pressure in the fuel headers and fuel piping before starting the engines. Each engine has a built-in single stage air compressor, 21.9 cfm., both acting against one unloader. Also installed is a 2-stage 10.2 cfm. motor-driven air compressor. These compressors maintain starting air at 250 psi. in four 30-in. by 96-in. air tanks. Scavenging air enters through engine-mounted filter-silencers and exhaust gases pass from the water cooled manifolds to individual spark arrestor silencers through separate properly insulated 12-in. exhaust pipes. Each engine has a gauge board with pyrometer and fuel oil, lube oil, water and scavenging air pressure gauges. In addition, a central engine room control panel is installed on a catwalk located above and between the engines. This offers central starting and speed control, with electrical tachometers, for each engine. Another gauge panel, with alarms, is also installed on this catwalk. Four separate alarms—high jacket water temperature, low jacket water pressure, high lube oil temperature and low lube oil pressure—for each engine are incorporated with a separate distinctive horn for each engine. If and when a malfunction occurs, the horn can be turned off, but an indicating light (one per alarm) will continue to glow until the abnormal temperature or pressure is corrected.

The *J. B. John* is equipped with a ship-to-shore radio telephone and a direction finder. Poor visibility and fog on the rivers and lake have, at times, caused schedule interruptions. The owner is now planning to install radar, an automatic steering device and an intership telephone system. The entire cement plant and the vessel are under the jurisdiction of Superintendent James V. Dailey who has 16 years of experience in the cement business with the Manitowoc Portland Cement Co., eight years at the main Manitowoc plant. Assistant superintendent is Gordon Rower, now also in his 16th year in the cement business. Captain of the *J. B. John* is H. J. Delatre, a relative newcomer to the vessel but a veteran of 44 years service on the lakes and inland waterways. The new equipment is in the capable hands of Chief Engineer Mace Gordon, a marine diesel man from the days when the first vessels were dieselized. Assistant chief engineer is Carl Payne and the second assistant chief engineer is Walter Perry, both of whom have had over a decade of marine diesel experience. Crew complement is sixteen: Captain, first mate, second mate, three wheelsmen, one A.B. seaman, one ordinary seaman, chief engineer, assistant chief engineer, second assistant chief engineer, three oilers, steward and porter.

New Engine Room Equipment

Main Propulsion engines—Fairbanks, Morse & Co. Two 6-cylinder, enbloc model 31AM8½, 8½ x 11½-in., 330 bhp. at 525 rpm.

Reduction gearing—Fairbanks, Morse & Co. 1.97:1 with Airflex clutch, Timken thrust bearing, propeller half coupling, clutch control valve and filter.

Heat exchangers—Ross Heater Mfg. Co.

Exhaust silencers—Maxim Silencer Co.

Air filter-silencers—Air Maze Corp.

Lube oil filters—The Hilliard Corp.

Lube oil strainers—Cuno Engineering Co.

Fuel oil filters—Purolator Products Inc.

Automatic temperature regulators—Water and oil, Powers Regulator Co.

Pyrometers—Illinois Testing Laboratories, Inc. Alnor.

Indicator cocks—Kiene Diesel Accessories, Inc. One per cylinder per engine.

Governors—Woodward Governor Co.

Vapor Phase on Drilling Rig

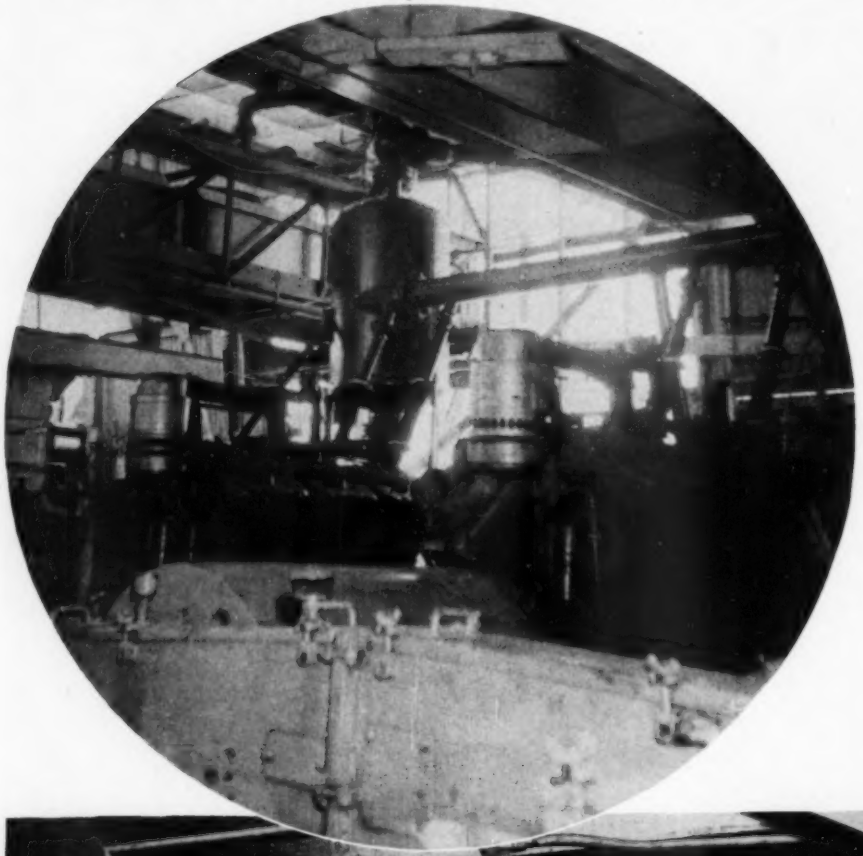
By FRED M. BURT

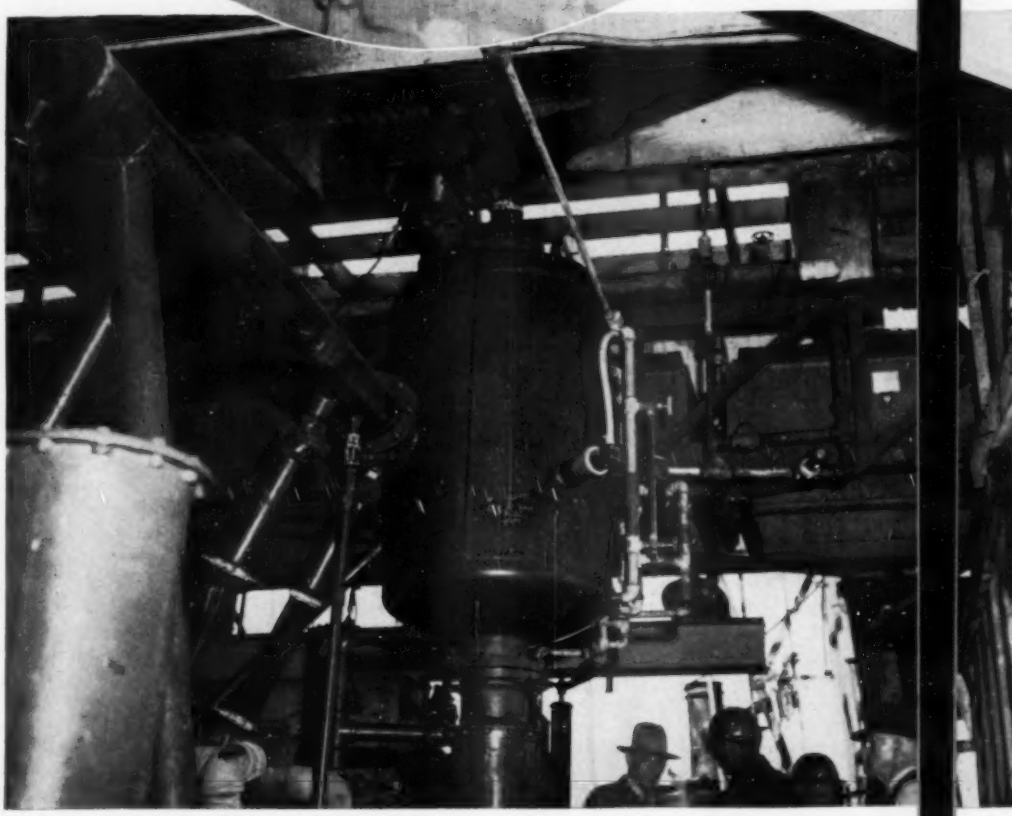
AT Signal Oil & Gas Company's Huntington Beach, (Calif.) lease there is a big, 130 ft. drilling rig which has a power plant to operate its mud pumps, rotary table, and hoists, consisting of four 12-cyl. Model L-3000, 300-hp LeRoi natural gas drilling engines, with Twin Disc clutches. One large Vapor Phase unit and six ECT-600 steam turbine driven fan condensers are used for engine cooling, eliminating four radiators and their fans. The large parasitic loads imposed upon the engines by these belt driven fans would have used up to about 8% of the useful horsepower being consumed. Therefore on this Signal four engine rig, the additional horsepower made available with the same fuel consumption runs close to 90-hp.

As illustrated in the drawing, the hot water leaves the cooling system of each engine, at the top, to lead into the Vapor Phase unit where it is converted into low pressure steam at up to 10-psi. This steam is piped to six condensers where it turns sensitive turbines connected to 36" fans. (It only requires a few ounces of steam pressure to turn the turbines and fans.) The steam passes on through condensers which are cooled by the fans, with the condensate passing on back to the engines to follow again through the same cycle.

The relation of these simple facts about the layout of the engine Vapor Phase condenser system, however doesn't tell the important reasons why in this drilling application. To be specific, drilling engines usually run continuously during the drilling of a well. Maximum power is used during hoisting. At other times, one or two engines may be loaded up drilling and driving mud pumps while others are idle. During this hoisting (pulling drill pipe to change bits, etc.), all engines are usually at full throttle until a stand of pipe is stopped for unscrewing. Then the throttle is closed. As the engines have been pulling maximum load, they boil over when suddenly slowed to idling and no load, (when the regular radiator fan cooling system is used) and the fan slows to a point where practically no air is passing over the radiator. Also vertical radiators lose cooling capacity when wind changes cause re-circulation of hot air and the fans are unable to bring in cool, fresh air.

Two of the 300 hp. LeRoi gas engines in center background, with Vapor Phase unit above them and Vortox oil bath air cleaners mounted on engine ends; starting engines are LeRoi model D-91, 25 hp., 4-cylinder units. In foreground is housing for the chain drive that connects all of the engiones. Upper left, turbine-fan condensers that cool and condense the low pressure steam.





Close-up of central Vapor Phase unit which converts the heat from hot engine cooling water into low pressure steam. Water fed into unit from four 300 hp. LeRoi natural gas engines. Vapor Phase tank 38" dia. by 68" high.

Hoisting load changes and the hot air situation results in under-cooling so at times the drilling engines can be operated up to load only by adding raw make-up water while running. Large quantities of raw water causes jackets and radiator tubes to become scaled up with rust, mud, and lime which soon reduces cooling capacity to require even more make-up water. In some drilling locations water may have to be hauled in at considerable expense. The makeup water for radiators is generally added by placing a hose in the radiator top to allow the in-flow of a stream of water, with no close regulation, resulting in overflow followed by the fan current picking up the water to fling it around and about, over engines, floors etc. Even when very large radiators and fans are used, these conditions are not entirely overcome under severe drilling conditions, and valuable, needed horsepower is used up in cooling the engines.

All of the fan load is eliminated with the Vapor Phase, and steam-driven, condenser fans, adding power for the heavy loads of hoisting. The only make-up water used is that required to replace leaks (none of which have occurred at Huntington Beach) but the automatic make-up valve takes care of such needs without manual attention. The idled engines don't have to work at reduced power until warming up as all of them remain at constant boiling temperature, all of the time whether idling or in any degree of service up to overloading. This cuts out any chance of condensation, sludging, corrosion, and any appreciable cylinder wear.

As may be noted from the illustrations, there is a relatively low ceiling over the engines. With the orthodox cooling system, the heat generated and then spread around by radiator fans, would make it unbearably hot around the engines and adjacent units, during the hot summer months. With each of the steam turbine-fan condensers having the capacity to condense 600 lbs. of steam per hour, atmospheric temperatures in the building are kept under control at a comfortable level. The steam turbines and fan speeds increase and decrease in relation to engine loads, always supplying the exact quantities of air required to cool the engines under all conditions of load or ambient air temperature. With this central system, some of the engines may be greatly overloaded but still be cooled well within the capacity of the Vapor Phase System.

On hot days the lube oil temperature never exceeds 230° F. and usually runs at about 220° F. under maximum load and ambient air conditions.

Back through the years this magazine has published a number of articles on Vapor Phase and it occurs to the Editors that some of our more recent readers may not be as familiar as we are with Vapor Phase. These words are really nothing else but a Trade name for high temperature cooling and we have been very enthusiastic for high temperature cooling for the past 12 years. In that time hundreds of successful installations of Vapor Phase and other types of high temperature cooling have been made and in practically every instance are still running to the satisfaction of their owners.

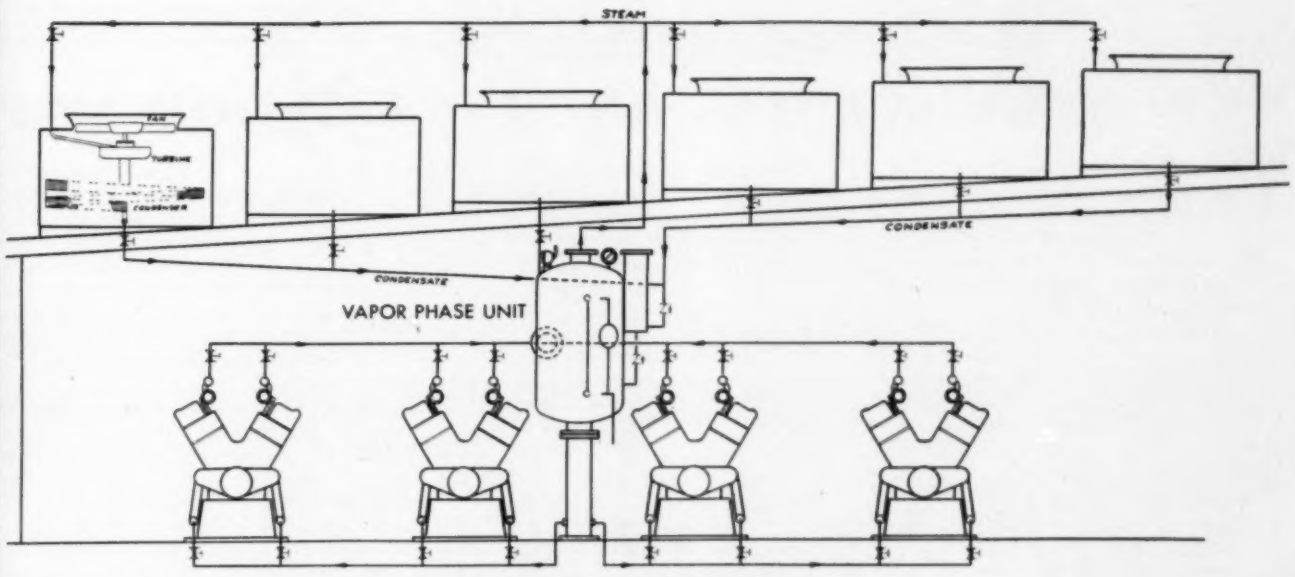
The Vapor Phase cycle consists of an engine circulating water pump which circulates the water from the Vapor Phase unit to the engine, the exhaust heat recovery unit, and back to the Vapor Phase unit. This is the primary or water circuit. As the water is never cooled in a Vapor Phase system, it must boil all the time that the engine or engines operate. It cannot boil over and lose water. The temperature of the circulating water is automatically controlled by the natural law of boiling and the temperature cannot drop below boiling even when the engine or engines are idling.

The water enters the Vapor Phase unit tangently, causing it to swirl around inside the unit. This swirling action separates all steam, air, foreign matter, and non-condensable gases from the water. The foreign matter is thrown down into the mud drum of the Vapor Phase unit. The steam, air, and non-condensables pass out to the heating system or steam condenser where air and non-condensables are vented. The hot water returns to the engine pumps and the cycle is repeated.

The Vapor Phase unit contains a built in steam separator designed to produce a very dry quality steam. The exhaust unit has a heat absorbing element through which all of the circulating water passes. The hot water out of the engine absorbs 50% to 60% of the exhaust heat (percent depends upon the model used). As the water is boiling when it enters the exhaust unit, there can be no condensating inside the unit, therefore, the unit will last indefinitely because corrosion is eliminated by the boiling water.

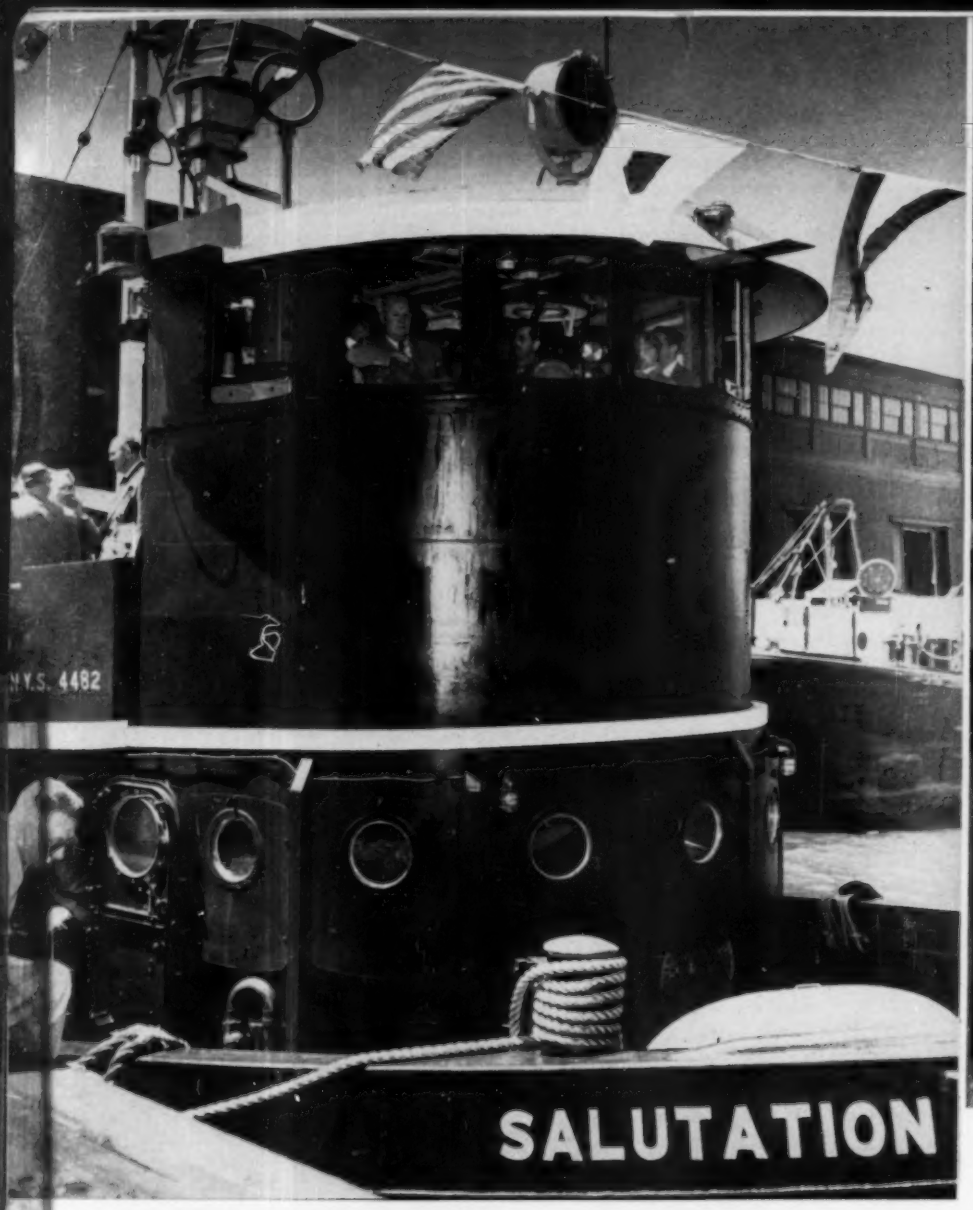
One of the latest applications of Vapor Phase has been in providing steam for a low pressure turbine driving a scavenging blower for a large 2-cycle engine, thus increasing the power delivered by the engine per pound of fuel consumed.

VAPOR PHASE COOLING WITH
STEAM TURBINE FAN CONDENSERS FOR
OIL WELL DRILLING RIGS



FOUR 300 HP LE ROI GAS ENGINES

ENGINEERING CONTROLS, INC LOS ANGELES



Standing before the retracted pilot house of the *Salut* Codrington, vice president of General Motors; R. B. Co Tams, Inc.; Frederick T. Kellers, retired, with his so McWilliams Blue Lines. To the left: the *Salutatio*

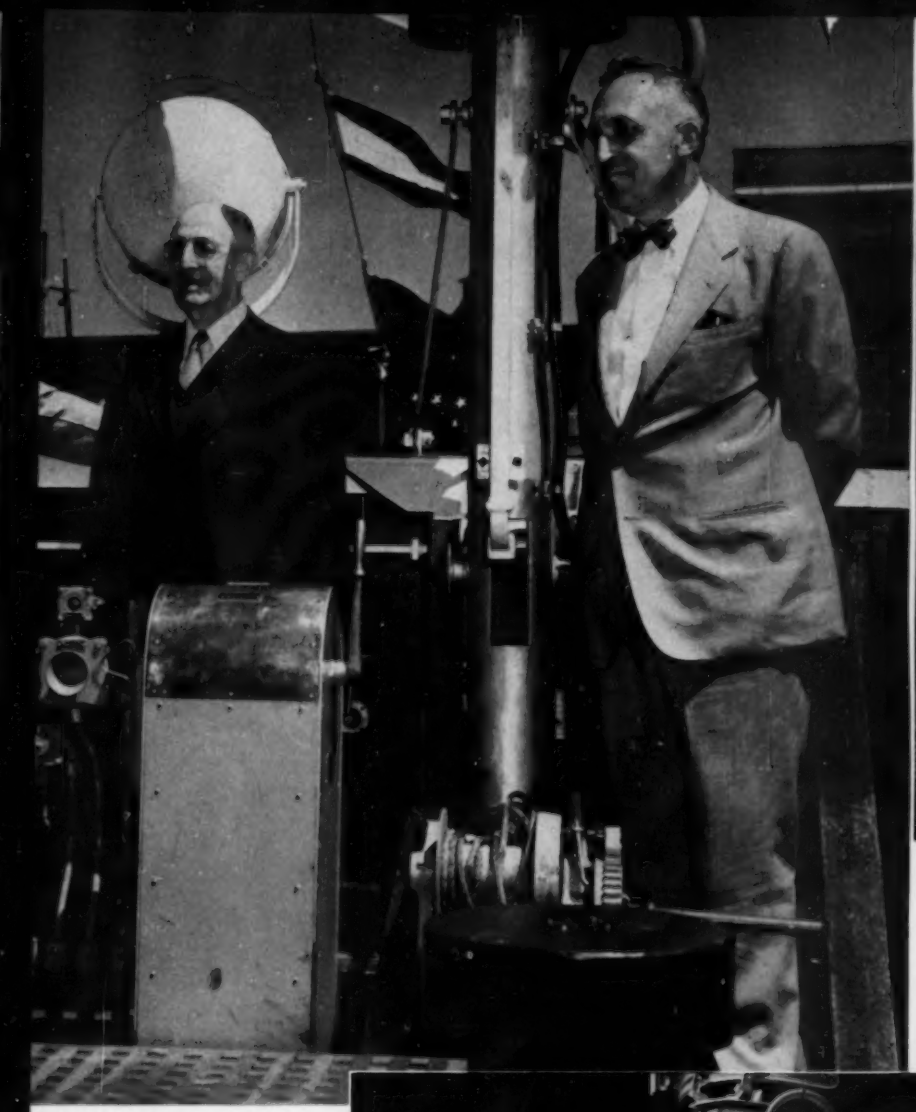
NEW TUGBOAT HAS AN "UP-AND-DOWN" PIL T

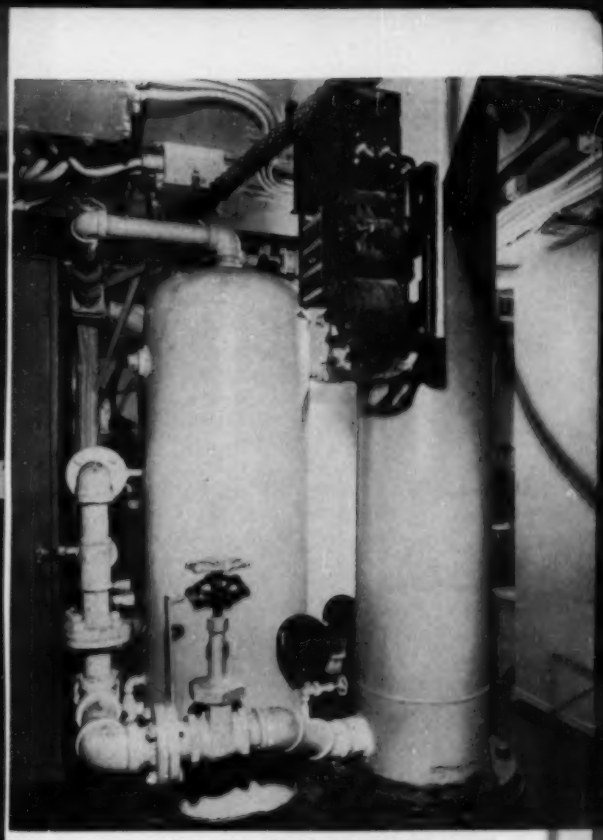
YOU can always depend upon George W. Codrington, vice president of General Motors, to do something new. Built to his ideas, a very unusual commercial vessel has just made her appearance in New York waters. For the first time in local shipping history a tugboat has been especially built with a pilot house that drops and raises again by means of a pneumatic-controlled hydraulic lift when the craft has to pass under a bridge along the New York State canal. This is a new 89-ft., 1200 hp. General Motors diesel-driven tug constructed for the James McWilliams Blue Line of New York, Charles Kellers, president, transporters of bulk commodities. *Salutation*, as the boat is named, was demonstrated to the press and to shipping men on August 2.

The reason for this retractable pilot house is that in order to provide proper visibility for the helmsman—both ahead and astern—the pilot house must be higher than the rest of the deck super-structure in which living quarters are arranged. Consequently, the normal pilot house is too high to allow the vessel to pass under bridges. With the *Salutation*, the forward part of the deckhouse has double sides, the pilot house proper fitting into the walls of the outer housing, and is lowered and raised by a lift fitted below the pilot house floor. An electrically-driven compressor in the engine room provides the compressed air. When approaching a low bridge, the helmsman pulls a lever, and the pilot house is lowered until its roof is level with that of the deckhouse roof, and simultaneously the two masts are folded over on hinges. After passing safely under a bridge, up comes the pilot house and masts.

Salutation was built by the Levingston Shipyard of Orange, Texas, from designs by Tams, Inc. and is 89-ft. 2-in. long overall by 23-ft. 9-in. beam and 11-ft. 2½-in. maximum depth. She is powered with a model 12-278A General Motors-Cleveland 12 cylinder V type diesel engine of 1,200 hp. (at 750 rpm.). By turning the propeller shaft at less than one-third the engine speed, it has been possible to have a husky propeller of 8-ft. 6-in. diameter by 5-ft. 6-in. pitch, and this gives the tug great towing efficiency. When running at full power for 24 continuous hours, the engine will only burn five tons of oil fuel, which is less than half the consumption of a steam tug of the same size and power.

Salutation is shorter than the tugs normally used on the canal, so that she can get into the locks with extra size barges. The James McWilliams Blue Line has five other diesel motor tugboats, one of which has diesel-electric propulsion. The new tug will tow barges laden with such products as petroleum, chemicals, coal, liquid sugar, and vegetable oils, on the State canal, and items like caustic soda and sulphuric acid on Long Island Sound. She will also go into the Great Lakes as far as Chicago, Illinois.





View of air tanks, hydraulic shaft, and mechanism used for raising and lowering the pilot house.

of the *Salut* are, left to right: George W. tors; R. B. Co aval architect and designer of , with his son arles F. Kellers, president of the *Salutation* h her pilot house raised.

PIL T HOUSE

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The *Salutation* with her pilot house lowered. Compare this with the illustration in top left-hand corner

COMPACTION DEVICE

By JAMES JOSEPH

FOR the first time in California highway construction, a unique, diesel-towed compaction device has obtained 95% compaction instead of the usual 90%. Getting that last 5% compaction has consumed the energies of 15 heavy diesel construction rigs and the efforts of a 125-man crew working 14 hours a day in relocating 1.75 miles of highway between Los Gatos and Santa Cruz, Calif. The project owes a lot to its diesel equipment. From June to November, 1950, for instance, a small construction fleet of but 5 scrapers and 7 International Diesel TD-24s moved a total of 659,000 cu. yds of earth. During a peak 10-day period in which crews worked two, 7-hour shifts, this same small fleet of dieselized rigs moved 114,000 cu. yds—thus far the record for the project.

The relocation of this highway is unique for several reasons. It contains, for example, three fills, one of them 1,500,075 cu. yds, largest of its kind in California highway construction. Two deep cuts, one of them to a depth of 235-ft, the other to 156-ft, are the toughest of their kind in recent highway building. These slice through the Santa Cruz mountains.

Five International TD-24 crawlers are presently moving an average of 8,000 yds of earth daily working two shifts. Each haul involves an International TD-24 crawler and 18-yard struck capacity scraper. A D-8 with transmission reversed for higher speeds is used as a pusher. These rigs have been making a 2,000-yd. roundtrip from borrow pit to fill area, fully loaded one way, and over 20 per cent inclines in the near-record time of 7.5 roundtrips every hour. On some runs, only 6 minutes have been consumed en route and return.

The highway's relocation and construction is complicated because it will be surrounded on two sides by a reservoir which will back-up against Lexington Dam, now under construction. This dam is one of several scheduled to increase percolation in an attempt to raise the falling water table in the Santa Cruz Valley. With water scheduled for each side, and reaching up to about 20-ft. of the highway's surface at high water mark, maximum compacting of the subgrading was necessary. That's the reason for the compaction machines.

In the compaction operation, sheepsfoot rollers in tandem, 10-ft. and 5-ft. wide roller hooked one to the other, are first towed over the fill area by TD-24s and D-8s, building up the fill in 4-inch thick lifts. Deepest fill by this method will run 140-ft. After four or five passes, 90% compaction is achieved. Contractor Guy F. Atkinson Co. has set-up a rule-of-thumb to estimate this 90% compaction. When the fill material doesn't shove out in front of, or push ahead of the rubber-tired compactors, it's time for their use. These specially-built, heavy-duty, pneumatic-tired compactors are ballasted with steel punchings to a minimum total weight of 40-tons, with a minimum 10-tons per wheel. Tire pressure for these rigs is rigidly specified at not less than 60-lbs, with equal pressure in all tires while they work on the job. California highway engineers specifically required that the compactors be towed, and not designed with their own motive power. Thus, D-8s are doing the towing job. The last five per cent compaction is the tough job. Usually four or five passes will do the trick, but not always.

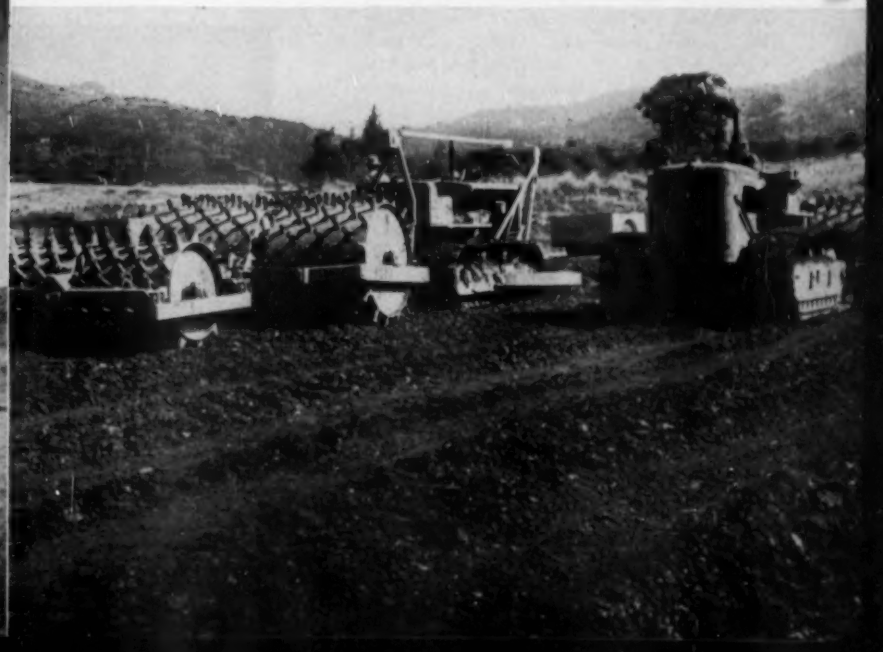
Three diesel-engined, (Cummins, 150 HP) Euclid dump trucks, working with a 2½-yd, Buda 6DC 182 hp-powered Bucyrus-Erie shovel have accounted for 800,000 cu. yds of earth on the project. The Euclids are 6-yd capacity. Master mechanic Joe Burnside, with repair shops on the jobsite, reports a minimum of trouble, despite the 14-hour workday. It's just another case, this time a monumental one, of diesels scraping, gouging and cut-and-filling, as they slice elbow room through steep terrain so that another super-highway can be built.

This spectacular 235-ft. cut on Los Gatos project. ➡

Three Euclid 16-yd. dumps working with shovel on Los Gatos project. The Euclids have 150 hp. Cummins diesels and the Bucyrus Erie shovel has 182 hp. Buda diesel.

After sheepsfoot rollers have compacted to 90 per cent, then these special pneumatic, rubber-tired compactors move in—achieving the additional 5 percent compaction.

Diesel-towed sheepsfoot rollers make first pass over fill—compacting to 90 per cent. To the right is one of the International TD-24 diesels, seven of which are used on this construction job.



COLBY, KANSAS

One Fairbanks-Morse Unit Runs 96 Percent of the Time to Save Kansas Plant More Than $19,000 a Year on Fuel Bill

By ERNEST V. SNELL*

ONE 1118-hp. Fairbanks-Morse dual fuel engine is saving Colby, Kansas, more than $19,000 a year in the cost of fuel for electric power production. To accomplish this, the unit has been in operation more than 96 percent of the time and has generated more than 83 percent of total plant output at a fuel cost of just 3.7 mills per kilowatt hour. Colby has a long and successful record of power plant operation. The first electric power was supplied to the town in 1910 by a small municipal steam plant which shut down at night. Then, in 1921, the city installed its first diesels, two 100-hp. McIntosh & Seymour air-injection units. Four years later, a 600-hp. McIntosh air-injection engine was added to the plant and in 1930 still another 600 hp. unit of the same type. In 25 years, this equipment, inefficient by modern standards, earned a net profit of more than $500,000.00.

The plant's period of modern expansion and improvement began in 1947 with the installation of a 1200-hp., four-cycle, supercharged, mechanical-injection Alco diesel. This was a distinct improvement over the old engines but continued the plant's dependence on expensive fuel oil. Colby currently pays 10.1733 cents a gallon for diesel fuel. The solution was found with the installation in June, 1949, of a 7-cylinder, 16 x 20-in., two-cycle, pump-scavenging, Fairbanks-Morse dual-fuel engine. This unit, which has a normal sea-level rating of 1,400-hp. at 300 rpm, was slowed down to 257 rpm to meet Colby's preference for a slow-speed engine and rated at 1118-hp. at the city's 3120-ft. altitude. This engine burns natural gas (which costs Colby 21.1 cents per 1000 cu. ft.) and a small quantity of pilot oil.

In the year 1950, the dual-fuel engine was the mainstay of the plant. The unit ran 8,442 hours out of a possible 8,760, a record of 96.37 percent of the time. The engine generated 3,766,000 kwh., 83.21 percent of the plant's 4,526,200 kwh. total. In achieving this production, the dual-fuel unit consumed 52,025 mcf of natural gas at a cost of $10,977.39, and 29,547 gal. of fuel oil at a cost of $3,005.91. Thus, the cost of gas per kwh. was 2.91 mills and the cost of pilot oil 0.80 mills, a total fuel cost of 3.71 mills per kwh. Fuel cost of the oil-burning engines averaged 10.54 mills per kwh. for the year, which meant a dual-fuel-saving of 6.83 mills per kwh. At this rate, the engine's production of 3,766,000 kwh. for 1950 represents a total saving of $25,721.78. This is not a wholly fair comparison since the diesels carried less economical loads than they would have if they had handled full plant production. A better comparison would use diesel fuel efficiency for 1947, a year in which the oil engines carried the entire load, and actual oil prices in 1950. By this standard, the diesels produced a kwh. for 9.262 mills. The dual-fuel engine's 3.713 mills per kwh. thus meant a saving of 5.549 mills, a 60 percent cut.

If, during 1950, all power had been generated by diesels at a fuel cost of 9.262 mills per kwh., the city's fuel bill would have been $41,921.66. Actually, with the dual-fuel unit producing at 3.71 mills and the diesels at 10.54 mills, the total fuel cost was $21,999.56. Clearly, the city made a saving of $19,922.10 by reason of having this one dual-fuel engine in operation for the year. If Colby had the gas engine capacity to produce all power at the dual-fuel rate of 3.71 mills, the saving would have been a big $25,115.88. Even this impressive figure does not represent the engine's full potential for savings. The load varies from as low as 300 kw. after midnight to a peak of 1120 kw. Since the dual-fuel is by far the most economical unit, it is run even when load factor is not favorable. The average load for the year cited was just 60 percent of engine rating. But Colby is growing steadily. There is much construction in progress and the average power consumption per residence is rising. As a result, the valley load is rising and the engine will operate at greater efficiency and economies.

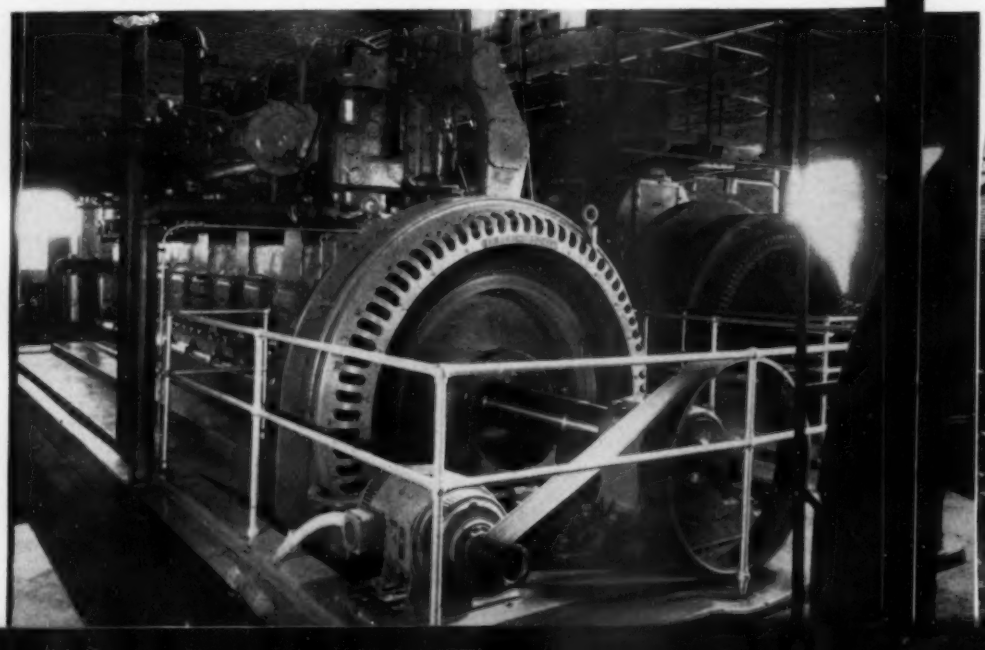
The natural gas used has a heating value of 960 btu. per cu. ft. The gas reaches the plant at 50 psi., is reduced to 30.5 psi. and metered and then piped to the throttle valve on the engine. The quantity of gas admitted to the cylinders is controlled by the governor to meet load variations. Special small-volume fuel pumps send a constant, accurately-metered charge of pilot oil to initiate combustion. In the event the gas pressure fails, the engine automatically switches over to oil and utilizes the regular diesel fuel injection pumps. A diesel fuel of 34-36 gravity is used for pilot oil and for the oil-burning engines. It is stored in three underground tanks, transferred by motor-driven pumps to elevated day tanks in the engine room, and piped by gravity through individual meters.

A detergent-type lubricating oil is used in the dual-fuel engine, both in the cylinder lubricators and in the crankcase. Lube is circulated by an engine-driven pump to all the bearings and then up to cool the pistons. Included in this circuit are a full-flow oil strainer and a shell-and-tube cooler. Part of the oil is drawn from the pressure side of the circulating pump to a cellulose filter and then returned to the crankcase. Scraper ring oil also is put through the filter and returned to the sump. A motor-driven pump is used to bring up oil pressure before starting the engine and after shutting down. Condition of the lubricating oil is checked regularly with a dilution indicator of the falling-ball type and shows no dilution whatsoever. Inspections show the engine to be as clean as it was when first put into service. Lube consumption has been low with the engine operating better than 5,000 hp. hr. per gal. of lube consumed.

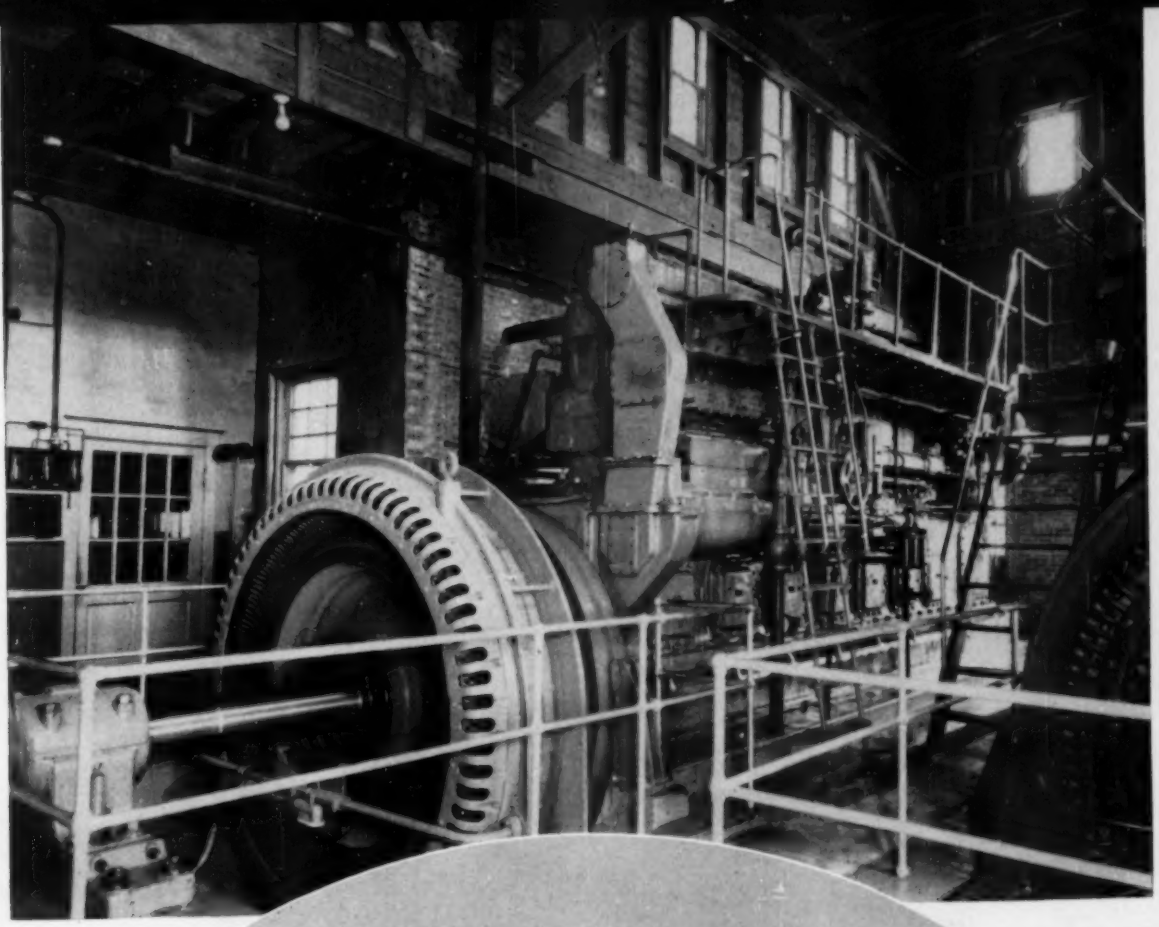
Climatic conditions on the plains of western Kansas introduce problems in the design and operating of a cooling water system. There are strong winds and in Winter lots of ice. Available water is hard and the plant must contend with both algy and scale. The answer has been a flexible, closed cooling system in which the basic unit is an atmospheric tower incorporating four 20-ft. tube sections with 88 tubes to a section. Three motor-driven centrifugal pumps circulate water through the engine jackets and the tower tubes. Any one or combination of pumps can be run and two pumps are required to handle three engines. There are three motor-driven centrifugals on the raw water circuit, each with a different function. One pump handles two sections of the tower, one handles the other

The two largest engines in the Colby plant are the 1200-hp. Alco diesel at right and the 1118-hp. Fairbanks-Morse dual-fuel unit at left. The gas burning engine has been in operation 96 percent of the time and generated 83 percent of total plant production.

This 1118-hp. Fairbanks-Morse dual-fuel engine has cut fuel costs more than $19,000 a year, producing power at 4 mills per kw. hr.



*Supt. Colby Municipal Power Plant.



two sections and the third feeds sprays just above the tubes. Thus, any one or combination of pumps may be used, providing a wide range of cooling. A large volume of water is used in this circuit rather than a fine spray in an effort to avoid scale. In the soft, jacket water circuit, very little makeup is required and the operators have not had to clean engine jackets in 10 years. All pumps are operated conveniently from the engine room by magnetic switches. Scavenging air for the dual-fuel engine is drawn through a set of four oil-bath filters into a plenum tank to dampen pulsations. Exhaust gases exist through a vertical snubber outside the building. A compact gauge and alarm panel for the gas engine holds an exhaust pyrometer and pressure gauges on fuel and lube. Starting air is supplied by a pair of motor-driven compressors controlled automatically to keep the air tanks at 290 psi.

The writer has had a hand in shaping plant policy for decades, having served 25 years as Colby city manager before taking his present post as Superintendent. Present city manager is R. J. Hayes. The top echelon in determination of power policy consists of Mayor W. E. Cooper and Commissioners L. W. Carleton and William Donelan, Jr., whose grandfather was Colby's first mayor. Over more than a quarter of a century, Colby has operated a highly profitable power plant. Today, the city has met the challange of high fuel oil prices with the installation of modern, efficient prime movers, designed to utilize the cheapest available fuel. All evidence points to another long period of dependable service to the community and to greater profits than ever before.

List of Equipment

Engine—One 1118-hp., 7cylinder, 16 x 20 in. Model 33FD16 dual-fuel engine operating at 257 rpm. Fairbanks, Morse.

Generator—One 780 kw., 2400 volt, 3-phase, 60 cycle alternator with V-belted exciter. Fairbanks, Morse.

Governor—Woodward Governor Co.

Pilot Oil—34-36 gravity oil. Shallow Water Refining Co.

Pilot oil meters—National

Gas—Kansas-Nebraska Natural Gas Co.

Gas meter—Metric Metal Works

Fuel filters—W. W. Nugent & Co., Inc.

Lube oil—Standard HD 30. Standard Oil Co. (Indiana)

Lube oil pump—Geo. D. Roper Corp.

Lube oil strainer—Purolator Products, Inc.

Lube oil cooler—Ross Heater & Mfg. Co. Inc.

Lube oil filter—Honan-Crane Corp.

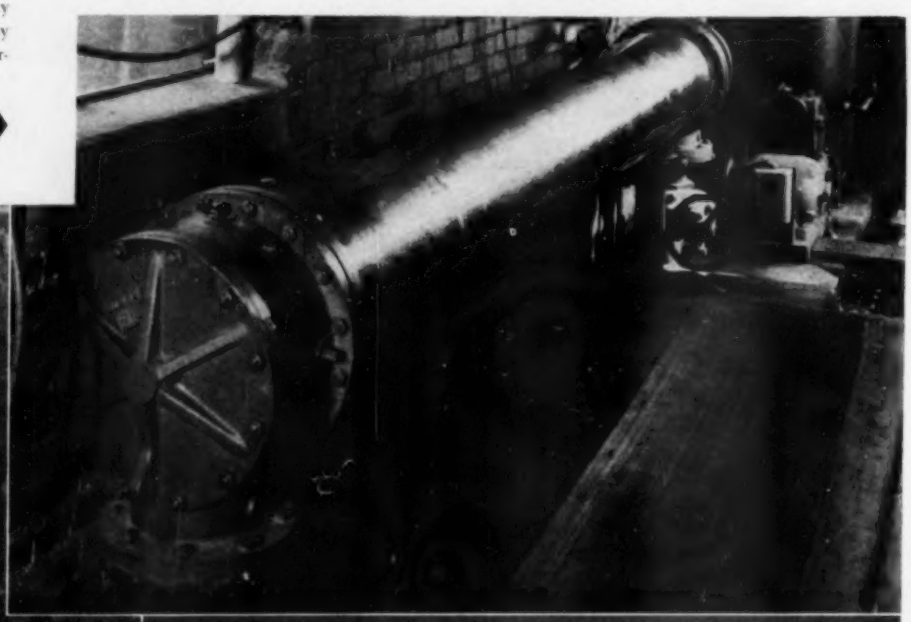
Cylinder lubricators—Madison-Kipp Corp.

Cooling tower—J. F. Pritchard & Co.

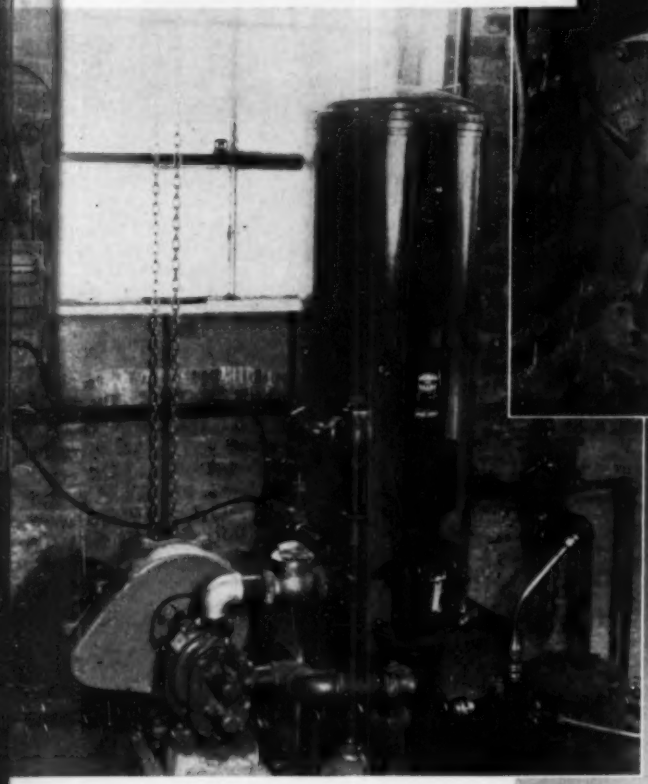
Cooling tower tube sections—Griscom-Russell

Air filters—Four Air-Maze Corp.

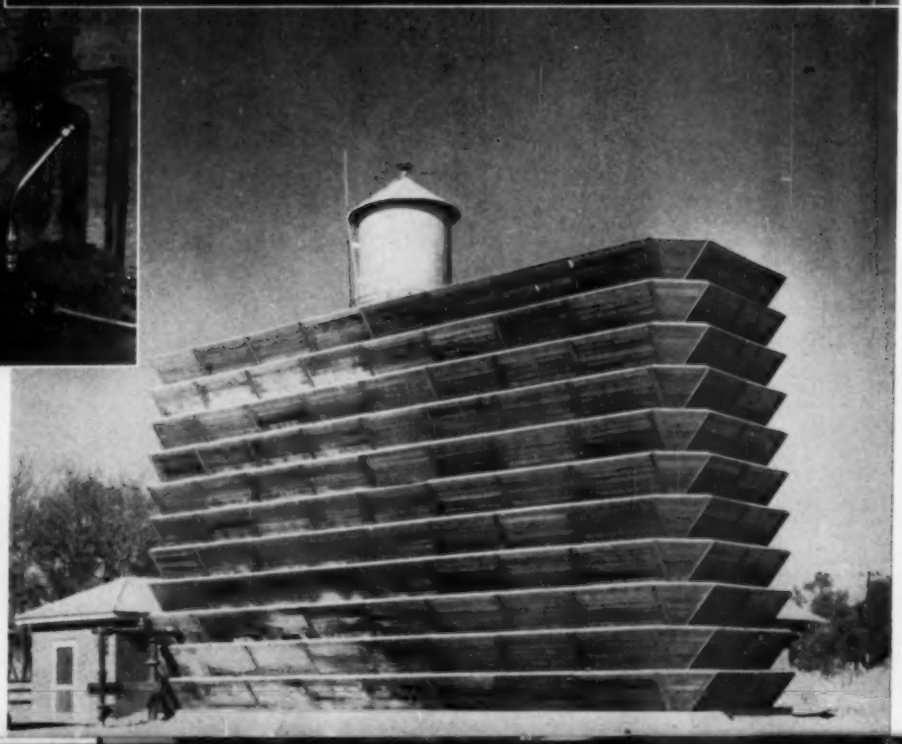
Exhaust snubber—Burgess-Manning Co.



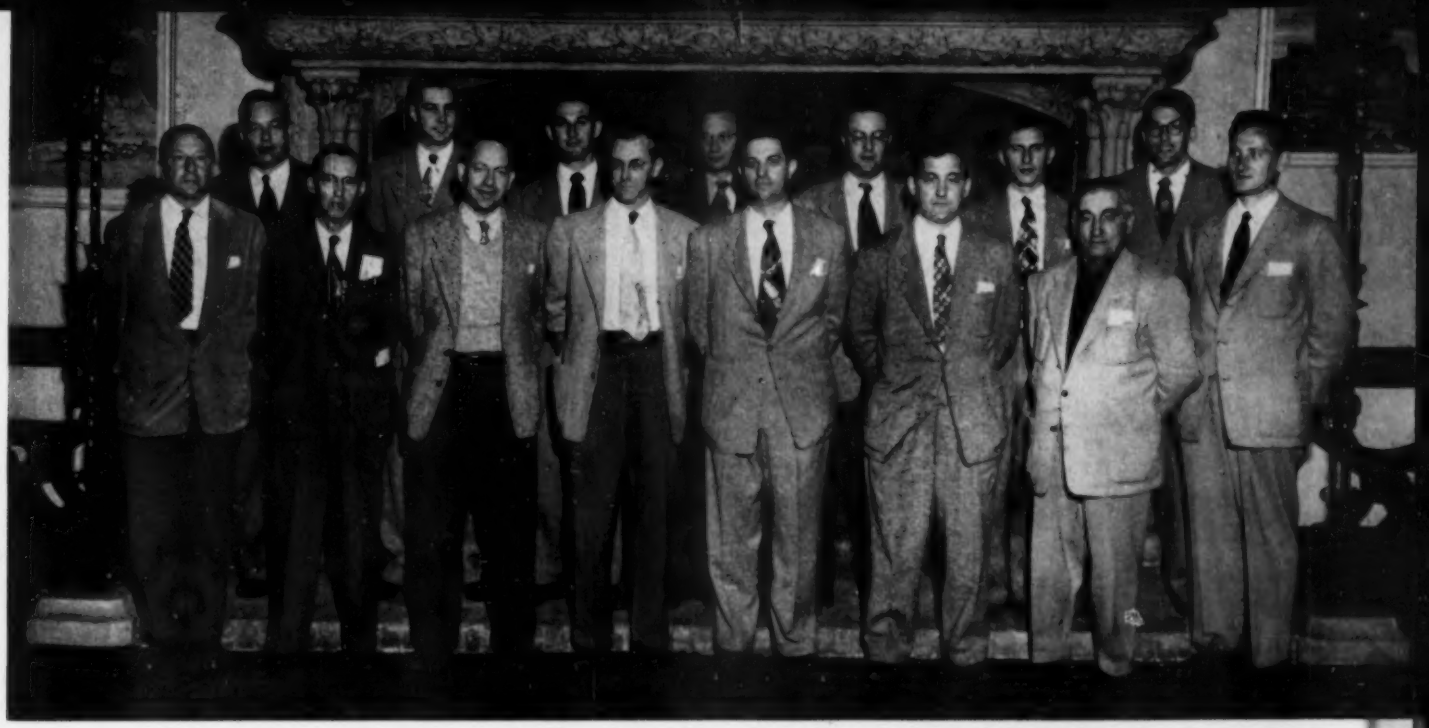
Lubricating oil for the Fairbanks-Morse engine is circulated through this Ross oil cooler.



A Honan-Crane oil purifier with cellulose filtration elements operated continuously on lube for the dual-fuel engine. At left is the motor driven Roper auxiliary lube pump.



All engines in the Colby plant are served by this Pritchard cooling tower which incorporates four Griscom-Russell tube sections.



Members of the Diesel Engine Manufacturers Association, at their meeting in Oakland, Calif., on November 6, welcomed a large group of engineering instructors from western colleges and universities to participate in a panel discussion of problems faced mutually by the schools and the industry. Host for the meeting was William G. Nostrand (front row, fifth from left), vice-president in charge of sales and engineering for Winslow Engineering Company. To his right (fourth from the left in the photo) is Professor C. J. Vogt, of the University of California, who led the discussion. Other educators in the group pictured include: From California State Polytechnic College—Hugh Haroldson; from Stanford University—Jack Landis, A. L. London; from the University of Nevada—William Van Tassel, J. R. Van Dyke; from the University of Santa Clara—Robert A. Oversmith, Richard K. Pefley; from the University of California—A. K. Oppenheim, C. Lorenzen, L. H. Lamouria, L. M. Tichvinsky, R. G. Folsom.

WINSLOW'S DEMA EDUCATIONAL MEETING

STRONG endorsement of a closer relationship between the diesel engine industry and American colleges and universities keynoted a meeting of the Diesel Engine Manufacturers Association held in Oakland, Calif., on November 6 and attended by more than two score industrial and educational leaders. Gathering under the chairmanship of W. G. Nostrand, vice-president in charge of sales and engineering for Winslow Engineering Company, the group first toured the Winslow filter and element plant in nearby Emeryville and then met at the Athens Athletic Club for a series of panel discussions led by recognized authorities in a variety of fields.

A panel of educators led by Professor C. J. Vogt of the University of California initiated the discussion which brought about recommendations aimed both at the industry and at the educational institutions. With representatives from Polytechnic Institute, Stanford University, Santa Clara University, and the University of Nevada participating, the panel drew from those attending a five-point proposal: 1. Efforts should be made to keep graduate engineers active in the engineering field, instead of permitting them to shift into other kinds of endeavor because of salary inducements, working conditions and similar influences. 2. Young engineers should be encouraged to engage in more design work, rather than specializing in research, sales or other phases of the industry. Delegates at the meeting declared themselves in favor of a "Back to the Drawing Board" movement. 3. The need for closer over-all cooperation between educators and the industry was considered imperative. It is needed, they asserted, both in planning curricula for the schools and in providing the industry with better-trained sources of future manpower. 4. Manufacturers should take two immediate steps. First, they should establish scholarships for general and specialized study by deserving students; and second, they should hire as many engineering students as possible during vacation periods in order to give them the practical knowledge attainable only "on the job." 5. Smaller colleges and universities, as well as other schools, need material help from the industry in the form of topics and information sources for thesis work.

Distinguished industry leaders conducted a variety of discussions on other pertinent subjects. Under the broad heading of "Preventive Maintenance," J. H. Caldwell, service engineer for the Cooper-Bessemer Corporation, headed a panel which dealt with engine operating conditions in the field. Other participants in the panel included: H. P. Henderson, of Worthington Pump & Machinery Corp.; H. G. Nagel, Fairbanks, Morse & Co.; S. W. Newell, Union Diesel Engine Co.; John H. Sheusner, of the Enterprise Division of General Metals Corp.; and Winslow's Mr. Nostrand. Mr. Sheusner, in turn, joined with John J. Meyer, Winslow chief engineer, in leading a discussion on the relationship between engines and filters. Chief engineer for his firm, Mr. Sheusner spoke on the topic, "A Diesel Man Looks at Oil Filters," while Mr. Meyer's subject was, "Filters and the Diesel Engine." Approaching their common field from divergent viewpoints, the two men proved to be in agreement on the desirability of full-flow filtration for lubricating oils and on the need for proper filtering of fuels.

The DEMA completed its list of outstanding speakers when it heard from Otto H. Fischer, president of the Union Diesel Engine Company. Mr. Fischer drew on his long experience and that of his company for his description of "Engineering Challenges in the Diesel Engine Industry."

Distinguished participants in panel discussions at the November 6 meeting of the Diesel Engine Manufacturers Association in Oakland, Calif., included this group of industry experts. Left to right, they are: J. H. Caldwell, service engineer, Cooper-Bessemer Corporation; John H. Sheusner, chief engineer Enterprise division of General Metals Corporation; H. G. Nagel, of Fairbanks, Morse & Co.; and John J. Meyer, chief engineer, Winslow Engineering Company.

"JOSEPH S. SCOBELL" CONVERTED

By WALTER RUDOLPH

RECENTLY the *Joseph S. Scobell*, owned and operated by the Erie Sand Steamship Co. of Erie, Pennsylvania, marked its third anniversary—and a happy one—as a diesel-electric drive vessel. The Winter-long conversion of this ship from steam in '47-'48, was a pioneering work of its kind on the Great Lakes and bears recounting. The *Joseph S. Scobell* works between such ports as Buffalo, Erie, Cleveland, Toledo and Detroit; it is capable of dredging mason, concrete and asphalt varieties of sand, at depths up to 72 feet. It has a total load capacity of about 3,000 tons, or some 2,000 cubic yards of sand.

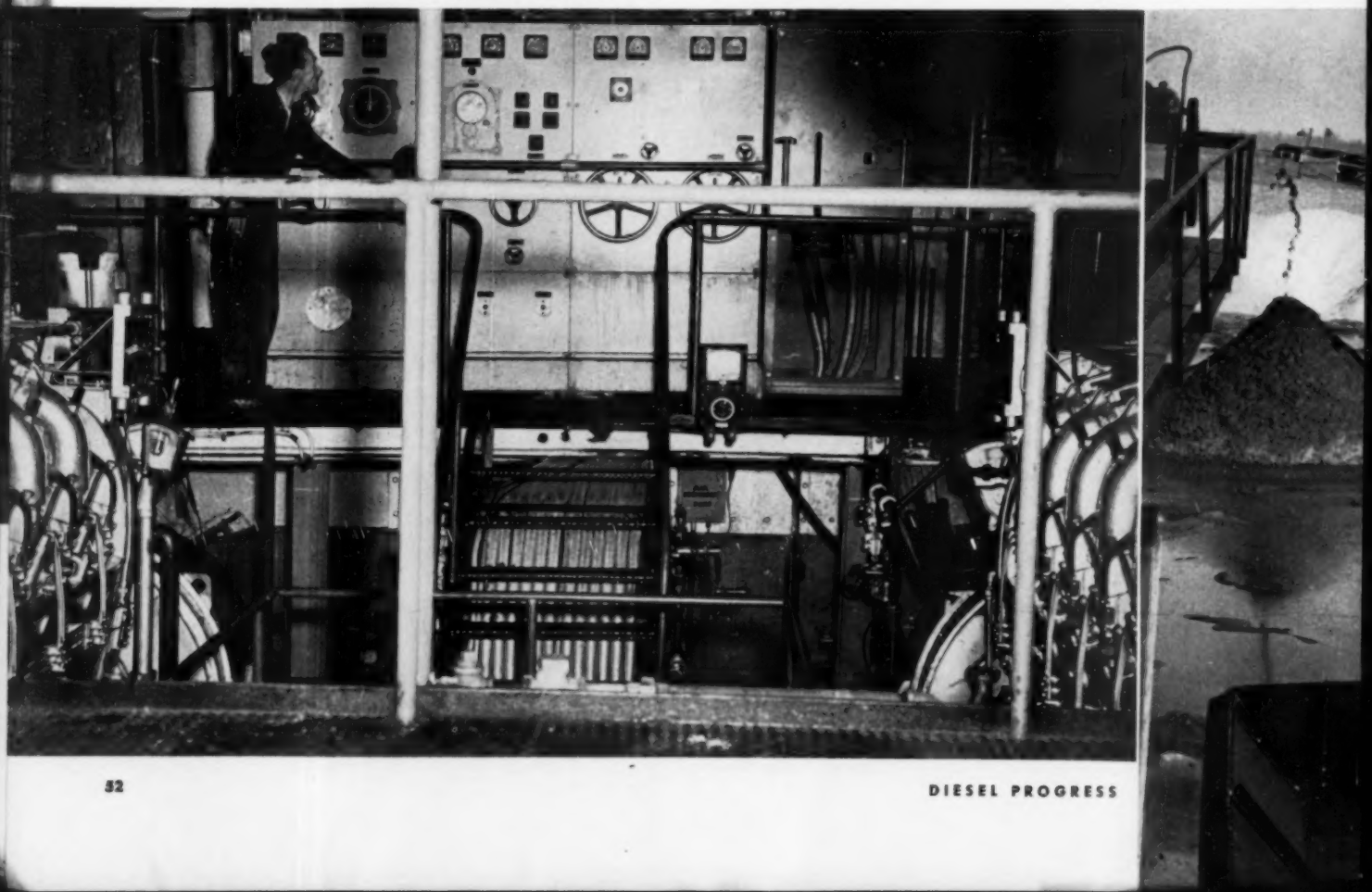
Some of these were facts even before the unique conversion; but beyond them, little of the old *Scobell's* operating data could apply to the modern ship of today. It presently boasts a faster running speed, more economical and dependable operation, with practically twice the former engine power. (One engine is used for main propulsion to keep the boat underway, while a second supplies power for the two dredge pump motors)—and it now has more compact auxiliary power for its many other pumps, all electrically driven.

Before getting into the details of the conversion, let's take a look backward, for the record, at the *Scobell's* history. It was built in 1891 by the American Shipbuilding Company of Cleveland, Ohio, and designated as a conventional type ore carrier, of 1445 gross tons, 920 feet long and 39 feet, 2 inches wide. Bulk cargo shipping was its original designation, and some of its early usage cannot be traced by its present owner. We know, however, that she was engaged in hauling lumber for a number of years previous to August, 1937, when the Erie Sand Steamship Co. purchased the boat from the Jones Lumber Company at Tonawanda, New York. Of course, at this time the ship was converted to fit her for sand dredging, a new and entirely different career.

In a section constructed midship, two 16-inch Amsco dredging pumps were installed, coupled to two 200 hp., fore and aft, compound steam engines. Now, fore and aft of this pump section midship, two cargo holds were fabricated; one 60 feet by 22 feet by 20 feet, and a second 61 feet by 22 feet by 20 feet. In addition, two dredge pipes 16 inches in diameter, about 80 feet in length, each, were installed midship along side of new after holds, to be raised and lowered for sand dredging by steam-powered winches below the dredge pump section. An unloading crane (Bucyrus-Erie) was positioned on rails running over both cargo holds for lifting buckets of sand to a deck level hopper, feeding a continuous conveyor belt which conveys the sand to a shuttle conveyor, thence to the shore boom which places the material 100 feet over the ship's side. These conveyors have had both gasoline and electric type drives, the latter formerly supplied by a steam driven generator on board the vessel.

Back when the *Scobell* carried two boilers, delivering some 145 pounds of pressure each; they supplied a 900 hp. reciprocating, triple expansion engine that turned the propeller. Throughout the engine room were miscellaneous small steam-driven pumps for handling bilge, fresh water, etc. When conversion got underway all these steam driven engines, boilers, piping and mountings had to be gutted from the hull. The work of removal, and the installation of new equipment, was done under the direct supervision of the owners, at the Company dock in Erie, Pennsylvania. The Paasch Marine Service in Erie being in charge of all structural work and Robert Scatterday of Cleveland, Ohio, acting as consulting electrical engineer. Heart of the converted ship is the installation of two General Motors (Cleveland Diesel) model .

Looking between two General Motors model 12-278 diesel generator sets at main control panel in *Scobell's* engine room.



12-278 diesel generator sets with exciters. Each develops 1235 hp. and is connected to individual General Electric 710-kw. generators, each of which in turn supplies power to a General Electric 885 hp. propulsion motor, or, as noted, the twin power setup can be divided between ship propulsion and power for running the dredge pumps. Fifteen hundred shaft horsepower derives from a Farrel-Birmingham, twin-pinion, single reduction gear, coupled to the two propulsion motors. In the dredge pump section midship, the dredge pumps are now run by two General Electric, 250-hp., dc. motors, coupled to the 16 inch pumps with 28-strand V-belts, from the 16 inch motor pulley to the 56 inch driving pulley. Winches that lower and raise the suction pipes are powered by General Electric motors; as well as General Electric motors and equipment now being used for miscellaneous power throughout the converted ship.

In the auxiliary power engine room forward of the main engine room, which was formerly the boiler level, are installed three Superior 8-cylinder diesel engines of 150-hp. each, coupled to individual 100-kw. generators. There is a small oil-fired boiler for heating purposes in this room, and a separate 18 foot switchboard and control panel for all auxiliary units. On a center elevation aft of the main engine room are installed two Ingersoll-Rand air compressors for starting the main engines; the fresh water pump, service pumps of various kinds, and other equipment, including control boxes, are also located here. Electrically-driven pumps include those for fire, bilge, ballast, sanitary, cargo, fresh water, lube oil and cooling. The diesel-electric conversion "nerves" are centered in a main propulsion control panel, aft on the top elevation of the main engine room. Beside this panel is the dredge pump cut-over board; and thus the chief engineer, Fred L. Mattson, has all main controls at his finger tips. Of course, there is a separate dredge pump power and operating control panel in the pump room midship, too. The two main diesel engines are fed from a day fuel tank in the main engine room, through a DeLaval centrifugal oil purifier. Alongside each of the two main engines are individual Hilco filters and reclamation units. Gardner-Denver ballast pumps, and miscellaneous other units are centrally located in the main engine room.

Captain Fred Mastine, master of the *Joseph S. Scobell*, controls the ship from the up-to-the-minute pilot house; with Askania Company electronic hydraulic automatic speed control system. The *Scobell's* system of propulsion control was in use on ocean-going vessels, and generally used on two boats, but upon being introduced on the Great Lakes in this ship, marked a "first" in its field.

Maneuverability of the ship is greatly improved, and advantages are especially evident with heavy river traffic in the Cuyahoga River at Cleveland, and the Buffalo River and Black Rock Creek at Buffalo. The *Scobell* generally gives more efficient, dependable service with diesel-electric drive; she is in practically continuous service, most of the year, and last year hauled some 500,000 tons of sand. Loaded, the *Scobell* could formerly make a maximum 11 mph., while the conversion enables it to attain about 14 mph., as well as increasing the length of the after cargo hold 8 feet, which increases the ship's carrying capacity by approximately 250 cubic yards. Captain Joseph S. St. John is President of the Erie Sand Steamship Co., and S. E. Smith, Jr., is Marine Superintendent.

View of *Joseph S. Scobell*, converted sand dredge, at her Erie Sand Steamship Company dock, Erie, Pa., unloading after a lake trip.

Supervising & Operating Engineers Section

CONDUCTED BY R. L. GREGORY

A DIESEL CRANKSHAFT FAILURE

THE crankshaft of a 1600 hp. diesel engine, driving a generator at a municipal power station broke after 8775 operating hours—equivalent to one year of continuous service. A thumping noise developed while the engine was operating at two-thirds load. Operators immediately closed the throttle and took the engine off the line, but the thumping became worse as the engine coasted, and finally became so severe that the whole building shook. Then, just as the unit came to rest, the shaft broke next to the coupling and the generator rotor dropped on the stator.

The cost of the damage ran high—a new crankshaft for an engine of this size is an expensive item—but damage to the generator was lighter than might be expected because the rotor had stopped turning before it dropped on the stator. Only minor injury to the stator iron resulted. Damage to the engine was also less than usual with crankshaft failures. The shaft broke outside the engine casing and internal parts were not seriously affected.

The shaft was 11¾-in. in diameter where it projected through the engine casing. A half-coupling was forged on the end, and a generous fillet was provided. The break took place in the fillet as shown in photograph No. 1. The surfaces of the break showed that the crack started at one of the bolt holes in the coupling—see arrow in photograph No. 2. The crack progressed slowly across the shaft for about two-thirds of its area, leaving the smooth surface that can be identified in the same picture. Then as the crack became deeper, the shaft became progressively weaker, the speed of cracking increased, causing rougher surfaces at the break. Finally, just before the complete breakthrough, the crack progressed in large bites, producing the jagged area also visible in the picture.

This accident is considered to be unusual because of the short life of the shaft and the location of the break. Progressive cracks in crankshafts are more likely to develop after several years of service and occur more commonly at the crank pin, or crank web, or in a portion of the shaft close to a crank web. In such places the stresses due to bearing misalignment, with consequent bending of the shaft at each revolution, are more concentrated.

Because of the unusual features of this case, extra efforts were made to determine the cause. The investigation included metallurgical analysis of the shaft material, torsional vibration tests, and careful checking of alignment. Metallurgical analysis, conducted by the engine manufacturer, showed that there was no fault with the shaft material. Torsional vibration tests of an identical shaft, also conducted by the manufacturer, showed that torsional stresses were not sufficient to have been the sole cause of the failure.

Records of bearing alignment tests that had been made a short time before the accident, and bearing alignment readings that were taken after the accident showed that the degree of misalignment, independent of other stresses, was not sufficient to have caused the failure. The coupling was carefully studied to determine whether any looseness or movement had been taking place between the two halves. All coupling bolts were found to be tight and well seated, and the faces of the coupling showed no indications of movement or looseness.

Perhaps the most important factor in the development of the crack was the shape of the counterbores at the bolt holes of the coupling. At each bolt hole, the coupling flange was counterbored to provide seats for the coupling bolts. The counterbores cut into the shaft fillet and interfered with its contour. The counterbores themselves were not provided with fillets; a sharp corner was left at the bottom of each counterbore where it cut into the shaft fillet. This can be observed at the two bolt holes shown at the lower left of photograph No. 2. It is believed that the sharp corners acted as "stress

. . . and now please turn to page 70 . . .

Figure I

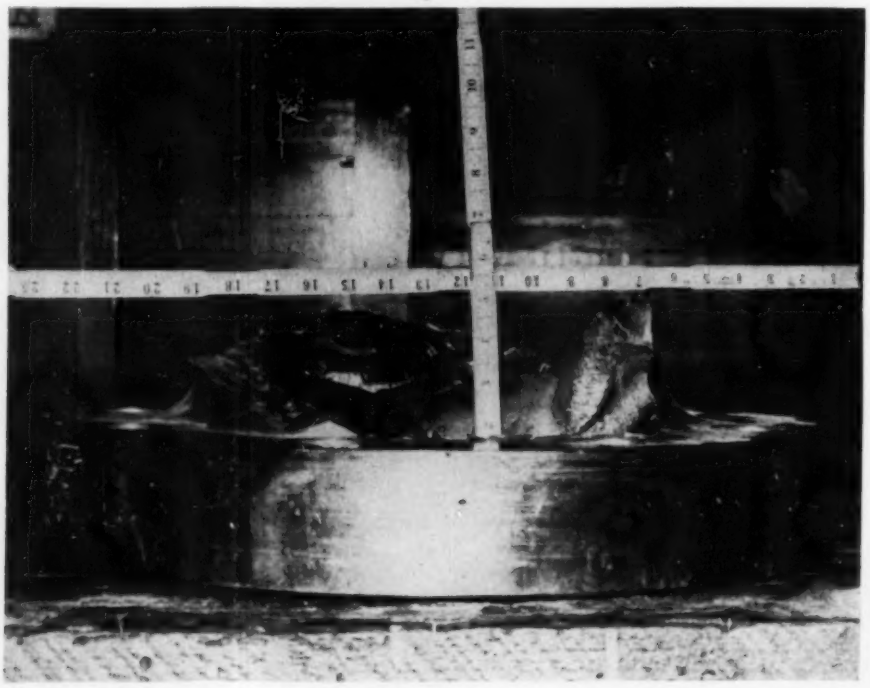
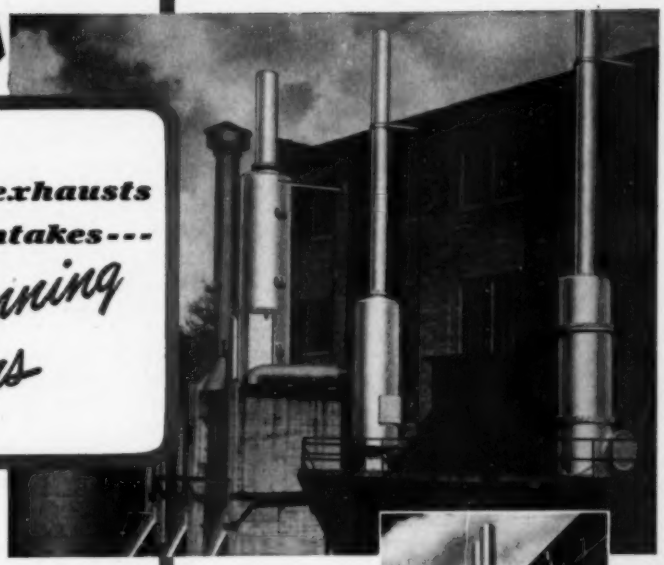


Figure II

POWER STATION



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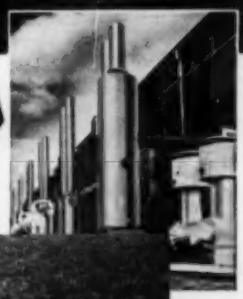
PIPE LINE STATION



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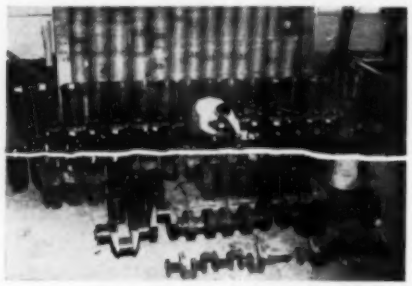
"VANDERLOY M" GOES TO WORK

Unique Iron Plating Process Now On Commercial Basis

By WILBUR W. YOUNG

THE advent of "Vanderloy M" on the industrial horizon heralds a new era in the recovery of worn machine parts. Unique in the electroplating field, "Vanderloy M" is a process of plating pure iron whereby worn parts that otherwise would be abandoned to scrap, are economically restored to original dimensions. Developed by John G. Poor, Director of Research for the Van der Horst Corporation of America, the process is now established on a large commercial scale in the first plant of its kind in the world at Olean, New York. Receiving carload after carload of diesel, aircraft and compressor cylinders, large and small crankshafts and various other parts, all virtually in scrap condition, this plant is returning them to useful service for about one-third the cost of new replacements.



A typical group of parts in "as received" condition.

Thus the long-established method of "truing up" worn journals, cylinders, etc. by removing more of the surface, and repeating the process as required, until sections were reduced to an unserviceable limit, fitting them in turn with non-standard matching parts, is supplanted. No more stocking of oversize bearings, pistons, rings, etc. No more long periods of down-time for vital production machines awaiting manufacture of intricate replacement parts. For example, worn crankshafts are reclaimed by the "Vanderloy M" process in a matter of weeks including shipping time, that would take months to replace with new parts. This releases large segments of original equipment manufacturing facilities for the production of urgently needed new machines. Dr. Hendrik Van der Horst stated that it may be possible to cut down restoration time by plating large parts in the field. He is exploring the idea of plating large crankshaft journals without removing the shaft from the engine bed.

A general view of the Vanderloy M plant.

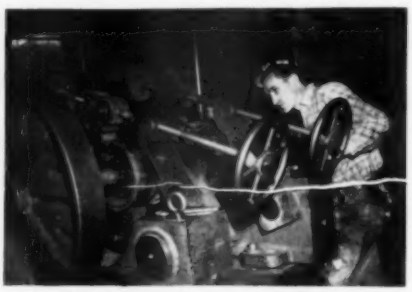
The possibilities of "Vanderloy M" seem to be unlimited. A manufacturer of soldering irons has found that plating the copper tips with "Vanderloy M" prolongs their life several times because it protects the copper from slowly dissolving with the hot solder. Another example is the renewal of a 20 inch diesel cylinder liner using only 12.3 pounds of "Vanderloy M" saving 1720 pounds of high-grade casting and extensive machining, the cost of which would approximate $1550.

Naturally, this leads to a consideration of the effect of "Vanderloy M" on machine design. It greatly implements the trend toward less bulk in relation to functional requirements. So evidence of this trend, in terms of smaller, thinner, high-output cylinders, not intended for extensive reboring, has resulted from acquaintance of designers with the forerunner of this process.

A preliminary cleaning operation to remove grease, carbon, rust, etc. prior to boring or other machining.

Much of the business immediately developed by this new "Vanderloy M" iron plating process derives from users of the original Porus-Krome process. Porus-Krome is a glass-smooth, diamond-hard plating that retains oil. Invented by Dr. Hendrik Van der Horst, it stepped up the combat efficiency of military engines for this country during the last war. Since then, it has gained world-wide acceptance as a means of multiplying the service life of cylinders and other bearing surfaces. But cost factors limited chrome alone, to comparatively thin application. Until "Vanderloy M" was developed, industrial equipment that has suffered heavy wear could not be renewed. Now, "Vanderloy M" is overlayed with Porus-Krome whenever that method is advantageous.

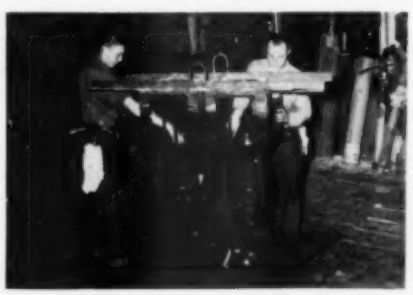
Microscopically, this new electrolytic iron develops a fine, columnar structure, with the close packed, columnar grain perpendicular to the surface with which it is bonded. The bond, established atomically between "Vanderloy M" and the base metal of parts plated with it, is indestructible. The application of enough force to tear one of the metals apart fails to disrupt its atomic adhesion to the other. While the "Vanderloy M" now in production is practically pure-electrolytic iron, there are laboratory indications that the bath can be adapted to alloy plating.



Boring a typical cylinder to remove dimensional discrepancies and to produce a suitable surface for Vanderloy M.

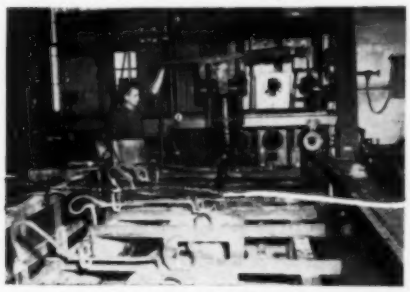
The entirely new "Vanderloy M" type of bath is especially well suited for the plating of heavy deposits. As these deposits build up to substantial thickness, there is neither an excessive grain growth nor roughness. "Vanderloy M" deposits can be made of ¼ inch radial thickness, or more. The limit of thickness, therefore, may be considered as determined by economics and design, rather than by the plating bath. Distinguishing features of the bath itself are that it remains stable, and produces the above results within practical limits of current density and working temperature.

Removing 'stop-off' wax from the surface to be plated with Vanderloy M.



This moderately acidic bath is operated at a moderate temperature as compared with such baths as the hot ferrous chloride solution. The advantage of low temperature permits "masking," or "stopping-off" with the easy and low-cost of the wax. The important problem of bagging likewise has been solved. Bags made either of Vinyon or Orlon contain the low-carbon steel scrap used as anodes. And since all substances remain completely dissolved, the bath is a true solution and, therefore, lends itself either to continuous or periodic filtration of the solution.

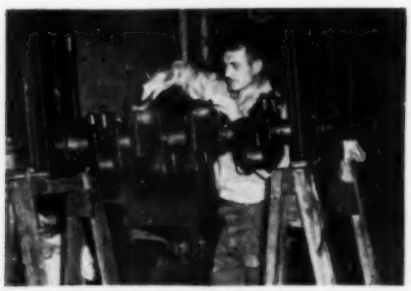
Preparation is essentially that required in general plating, consisting of the usual degreasing anodic alkaline cleaning, necessary stopping-off of areas not to be plated, and, just prior to plating, anodic etching in a sulphuric acid bath. This etch not only cleans the metal but is adjusted to remove a superficial amount of metal which generally exists



A view of a plating tank in operation, showing a typical cylinder being immersed in the bath.

as a "cold smear," or a fragmented, crystal-distorted surface, resulting from previous machining. Thereby, the "Vanderloy M" is deposited, upon and bonds atomically with a virgin metal surface which is free from fragmentation and residual stress. Note that in both the alkaline and sulphuric baths the piece to be plated is made anode and not cathode, thus minimizing the absorption of hydrogen. While pre-cleaning methods eliminate occlusion of hydrogen in the part to be plated, some hydrogen is occluded during the plating operation because the part must necessarily be made cathode. No effort is made to remove this hydrogen when "Vanderloy" is deposited in engine cylinders, as tensiles and elongation of the thin layer in the cylinder is relatively unimportant. Furthermore, in operation, the cylinder is subjected to a long-term, low temperature heat treatment which drives off the hydrogen. However, on parts subjected to stress, such as crankshafts, a heat treatment of several hours at 600°F. effectively drives off hydrogen.

A step in the cleaning preparation of a crankshaft for plating.



Variations in bath composition and plating conditions can produce "Vanderloy M" with a tensile strength as high as 100,000 psi or as low as 50,000 psi. For the present, the conditions established for production approximate physicals averaging as follows: Tensile strength, 75,000 psi; Yield Point, 60,000 psi; Brinell Hardness, 200-210. "Vanderloy M" as now plated on outside diameters and surfaces, machines about the same as alloy steels, having a tendency to be tough. Machining can be accomplished, however, with high-speed steel cutters. Machining of inside bores is more difficult but honing and grinding, of course, are readily done.

Fatigue tests are now in progress to determine the endurance limit of "Vanderloy M" and its effect on the endurance limit of the base metal. Normal expectation would be that it would behave as all ferrous metals and have a limit for complete reversals of approximately 40-50% of its ultimate strength.

In developing the concept of "Vanderloy M" as a broadly applicable and economic process for renewing the worn but expensive parts of engines and machines, a plant facility specifically designed for the purpose has been provided. Now completed, on 27 acres of company-owned land adjacent to the main line of the Erie Railroad, is a steel and concrete building 60 x 288 feet in extent, that embodies the first unit of this design.

This entire facility is integrated with sources of supply and transportation. A Niagara-Mohawk substation is located just outside the new plant.

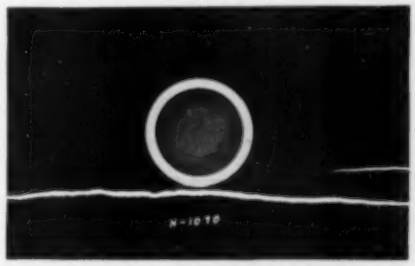
Control panel for a plating tank.

At present, it diverts 1,500,000 ampere hours of current per month for the plating of "Vanderloy M." This is rectified through 16 General Electric 500 ampere units and 3 Greene rectifiers at 2,000 ampere capacity. Main gas and water lines of the City of Olean traverse the plant property. Water, under pressure of 120 lbs. per square inch, is available in almost unlimited supply. Gas is more than adequate in volume for any foreseeable plant expansion.

Over 500 feet of production line is arranged in a long "U" shape. It leads directly from the receiving area, extending down the full length of the plating floor and back again to "shipping." One half of the production line is devoted to preparation of the parts to be plated. The other half comprises the steps necessary in the application of "Vanderloy M" and finishing. From receiving inspection, the parts are first dipped in an alkaline solution to cleanse them and remove rust. The cleaning and reconditioning of badly worn or scrapped parts may occasionally entail welding shut of small breaks, cracks, or chipped holes in the surface to be plated. After being cleansed and rinsed, the worn bearing surfaces of each part are machined.

To illustrate, cylinders are rebored to eliminate ring steps, fluted wear and scoring, and to re-establish concentricity of the bore. Thereafter, the oil, with which the cylinder wall has become impregnated during use, is baked out. This prevents a seepage that might upset later plating steps.

On ported cylinders it is necessary to radius the port edges with an abrasive wheel, and to protect such areas with paint. Port radiusing prevents excessive "treeing," or piling up, of the actual plate on sharp edges during the application of "Vanderloy M." Painting of the ports prevents the plating from becoming distributed beyond the cylinder

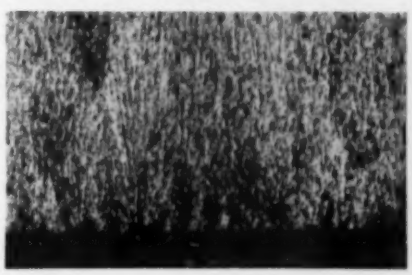


Cross section of Vanderloy M plated on cast iron rod of 1-inch diameter showing thickness of the plating.

wall proper. The protection of all other areas on which plating is desired is accomplished by dipping the parts in molten wax. Thereafter, they are assembled in plating fixtures and are ready for renewal with "Vanderloy M."

By immersion in a tank of sulphuric acid, the parts are submitted to a brief electro-etch to prepare the plating surface for atomic bonding with "Vanderloy M." After rinsing, the multiple fixtures and parts are hoisted into a tank containing the electrolyte of "Vanderloy M." When iron plate of desired thickness has been built up on the bearing surfaces, the parts load is detached from the plating current and transferred to the rinse tank. Thereafter, the wax masking is removed by hot water treatment, followed by immersion in a tank of protective oil. Then the parts are disassembled from the fixtures. Grinding of the edges of the plated areas, to re-establish clearance and necessary radii (as in cylinder liners at their ports and both ends), completes the operation.

Cross section of Vanderloy M as seen through the microscope at 100 magnification showing fibrous columnar structure.



WHAT'S GOING ON IN ENGLAND

CONDUCTED BY **HAMISH FERGUSON**

Hamish Ferguson was appointed Secretary to the Diesel Engine Users Association in London in 1944. Previously senior technical assistant to Diesel and Insurance Consultants, London, and for several years with English Electric Company in the designing and erection of large diesel generating plants. Mr. Ferguson continues to do independent consulting work.

RESEARCH ADDS UP TO IMPROVED ENGINE EFFICIENCY

THORNTON RESEARCH CENTRE. The Thornton Laboratories of the Shell Refining and Marketing Co. Ltd. constitute the largest of the Shell Company's research and development centres in the United Kingdom. More than 800,000 sq. ft. of floor space are in use and the staff engaged exceeds eight hundred engineers, chemists, physicists, and assistants. Seventy-eight engines of various types are housed in the different sections and, in addition, there are many rigs and appliances for small-scale work.

The Centre works in close collaboration with other comparable Shell research establishments in the United States and the Netherlands, and is engaged in the study of consumers' requirements and problems in the United Kingdom and all countries outside the United States. The research carried on is largely of an applicational nature, and great importance is attached to the maintenance of close contact with manufacturers and consumers as a factor in guiding the efforts of the research teams. A proportion of the work is devoted to research of a more fundamental nature in connection with long term development work, and also to assist in making a sound approach to the application problems. Whilst the main interest at Thornton is in the oil itself, investigation of the part played by engine design in the performance of fuels and lubricants is also an important line of approach.

A view of the laboratory and administrative offices.

DIESEL FUELS. The method of approach is to study diesel fuels and their structure with a view to improvement within the limitations of refinery possibilities and costs; also to investigate what can be done to use present fuels even more efficiently in existing engines. Simultaneously, parallel research and development work is arranged to keep pace with all new design trends, with a view to correlating this with fuel versatility.

Diesel fuels for medium and high speed engines are at the present time mainly distillates, such as gas oil. There is, however, an ever increasing demand for these distillates for a great variety of purposes, and to spread the load it would be beneficial if heavier fuels could be utilized in compression ignition engines. Work is in hand on the use of heavy fuels of increasing viscosity, with a view to discovering what troubles are likely to arise under these conditions, and what remedies can be applied to correct them.

Fuels of low ignition quality are also being investigated. These, in general, give better fuel consumption and power output than those of higher cetane number, but under normal conditions their use, in high speed engines, may result in rough running. Pilot injection, however, exploits the use of such fuels with little reduction of their good performance characteristics. In this system a small amount of the fuel is injected into the cylinder in advance of the main charge, and improved combustion results.

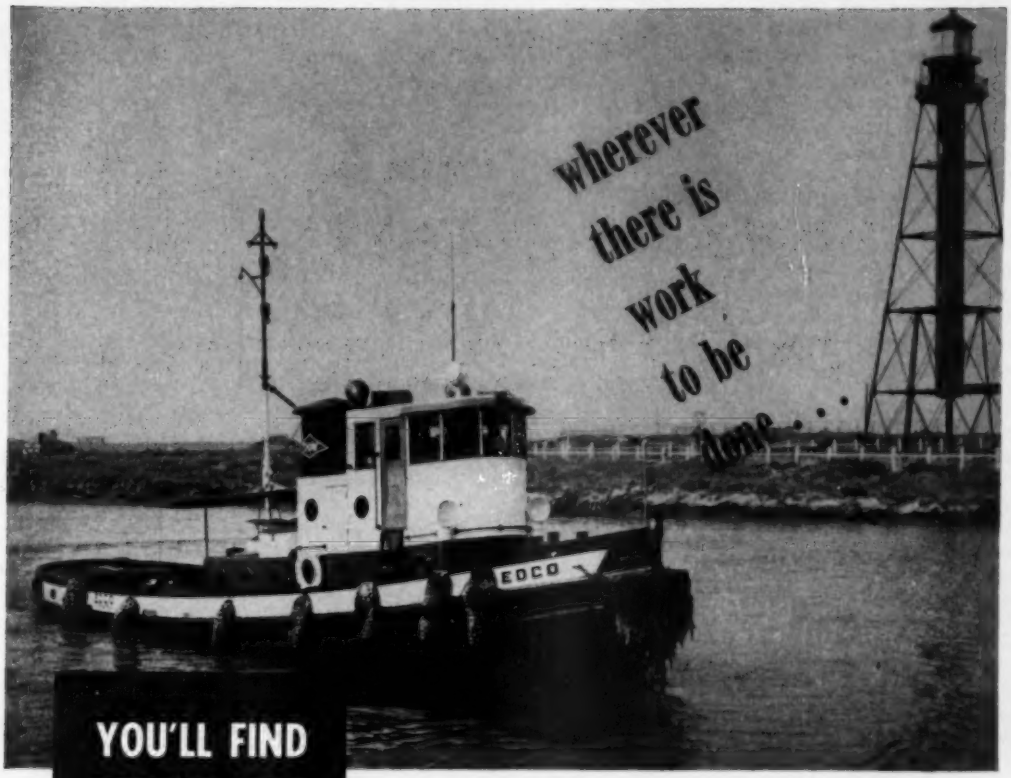
Some diesel fuels are found to have a comparatively high sulphur content and this may present a problem. In certain circumstances the use of the fuels may lead to increased cylinder and ring wear, as well as contributing to engine fouling. Many ways have been, and are being, tried to overcome this, including the addition of agents either to the fuel or lubricant; also the metallurgical approach, as, for example, chromium plating. Various types of porous plating have been produced, and Thornton has developed one which gives promising results with cylinder barrels coated in this way.

INDUSTRIAL GAS TURBINE FUELS. The Industrial Gas Turbine is undergoing rapid evolution as a prime mover, and in order to keep abreast of fuel requirements a program is in hand which includes the development of both fuels and combustion equipment. In addition to the small scale experimental burners for fuel studies at Thornton, a further plant has been erected nearby which is capable of supplying the large quantities of air under pressure required by a full-scale unit.

Included in the subjects studied are combustion efficiency, the effect of hot gases on turbine metals, and deposit formation with reference to its effect on heat exchangers.

DIESEL LUBRICANTS. Whilst testing in the actual engine is an essential part of the development of lubricating oils, real progress is possible only on the basis of some knowledge of the fundamentals of lubrication. A group of chemists and physicists is therefore engaged in investigating the basic phenomena of friction, the wear of metals and the chemical behaviour of the oil in service. An exhaustive study is being made of all aspects of the subject of lubrication in view of the increased severity of the demands imposed on the lubricating oil by design trends in recent years. Laboratory engine studies on a wide range of units are constantly in progress and particular attention is being given to the reduction of corrosive cylinder wear arising from low-temperature operation, and to engine cleanliness.

Having recently made a tour of the Research Establishment, the writer left with the impression that each and every one of the fuels, lubricants, and additives which are allowed to reach the consumer had been exhaustively tested and proved under working conditions of greater severity than those normally found in service operation. These meticulous methods have insured the success of the products at present available; in addition, the results being obtained under the long-term development program show promise of further improved oils.



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SERVICING ZERO-LASH HYDRAULIC VALVE LIFTERS

THE Zero-Lash Hydraulic Valve Lifter provides a means for automatically maintaining zero-lash, or zero-clearance, in the valve train. Servicing the lifters requires only ordinary tools, and the procedure is easy to follow. In any service operation there is a best and easiest way to do it. The instructions in this article give a simple, step-by-step method. Each step is important. In maintaining any piece of equipment, you can do a better job if you understand how it works. So let's get familiar with the hydraulic valve lifter's operation.

There are several types of hydraulic valve lifters. They vary in shape and size, in their position in the valve train, and in their assembly. But regardless of type, the basic part of the lifter is the hydraulic unit. This is the part of the lifter that provides the feature of self adjustment to variations in the length of the valve train. The names given to the different elements of this unit will apply to all other types of units no matter what the variations in design may be.

It is important to remember that the plunger and cylinder are selectively fitted at the factory and the plunger from one cylinder cannot be interchanged with other plungers. The plunger spring is installed at the factory and cannot be removed or replaced without special equipment. It may be considered an integral part of the plunger. The ball check valve is permanently built into the cylinder and cannot be removed. Therefore, for all practical purposes, the hydraulic unit can be considered as consisting of two principal parts: the cylinder and the plunger. In most cases, the hydraulic unit is inserted in an outer lifter body, which makes contact with the lifting cam. In other cases, the unit is somewhat different in construction, requiring no outer body, usually being inserted between the rocker arm and valve of overhead valve engines.

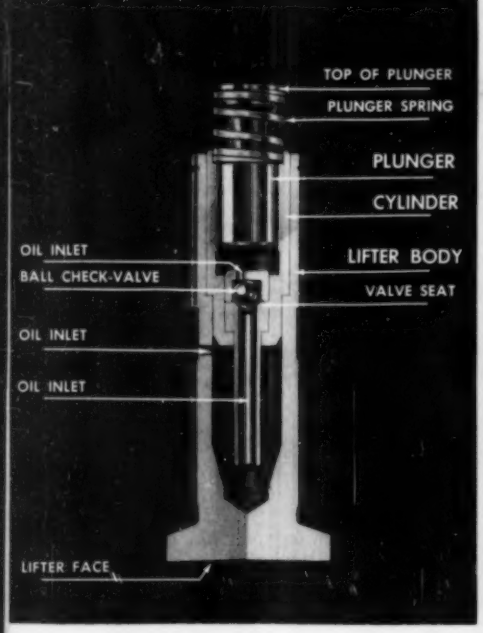
The hydraulic unit consists of a plunger that operates in a cylinder. The plunger is held in its outermost position, against the push rod, or valve stem by a light spring. This leaves a small chamber in the bottom of the cylinder, below the plunger. This chamber is kept filled with oil by pressure from the engine's lubricating system. The oil enters the chamber through inlets in the base of the cylinder. A ball check-valve, located at the cylinder inlet, controls the flow of oil. When the ball check-valve is closed, the oil in the chamber, being non-compressible, lifts the push rod or valve stem as positively as though the whole lifter were a single piece of solid steel.

As the valve train expands and contracts with changes in engine temperature, the lifter adjusts its own length to compensate for the changes. Accurately determined clearance is provided between the plunger and the cylinder wall, which permits the escape (or leak-down, as it is commonly called) of a small amount of oil from the chamber. The amount of leak-down may vary with lifter and engine design. This leakage automatically compensates for expansion in the valve train, allowing positive valve seating. On the other hand, when the valve train contracts, the plunger spring holds the plunger in its outermost position. This relieves pressure on the oil in the chamber, and on the ball check-valve. The ball moves from its seat and permits the intake of oil from the engine's lubricating system. Thus, the lifter corrects its own length each time the valve closes, to maintain zero clearance.

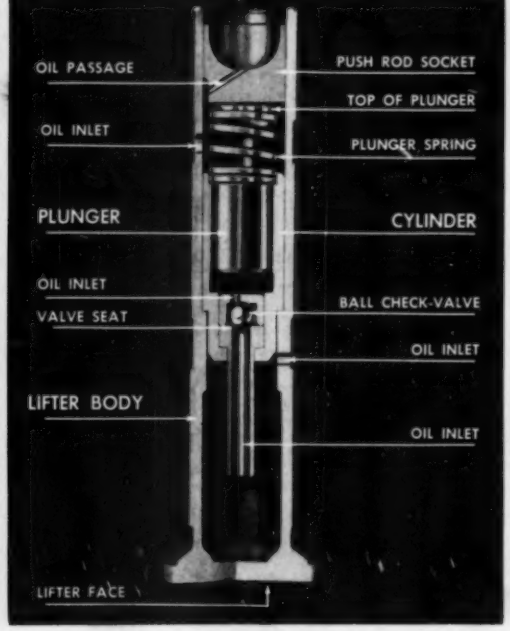
Types of Hydraulic Valve Lifters. In the mushroom type for L-Head engines the hydraulic unit is inserted in an outer body, and the assembly is referred to as the lifter. The hydraulic cylinder may or may not have a tubular extension of the oil inlet at the bottom of the cylinder. In the servicing instructions, any reference to the oil inlet of the cylinder will also refer to the outer end of this tube. The outer body is provided with an oil inlet hole to permit oil from the engine's lubrication system to enter the body and reach the hydraulic unit. This type of hydraulic valve lifter is installed between the lifting cam and the valve stem in an L-Head engine. The lifter face makes contact with the lifting cam. The top of the plunger operates directly against the valve stem. The guide in which the lifter travels is, in some engines, a part of the cylinder block. In other engines, the guide is a part of a removable bracket, permitting the removal, for servicing, of the guides with their lifters, at the same time.

The mushroom type for overhead valve engines is installed between the cam and the push rod. You will notice that the walls of the lifter body rise above the hydraulic unit, leaving space for the insertion of a removable socket, which rests on the top of the plunger, and receives the end of the push rod. You may find that in some sockets a drilled hole is provided to allow the passage of oil from the side of the socket to the center of its concave surface. This is to permit oil under pressure to reach the hollow push rod and to pass through the rod to the rocker arm mechanism for lubrication purposes.

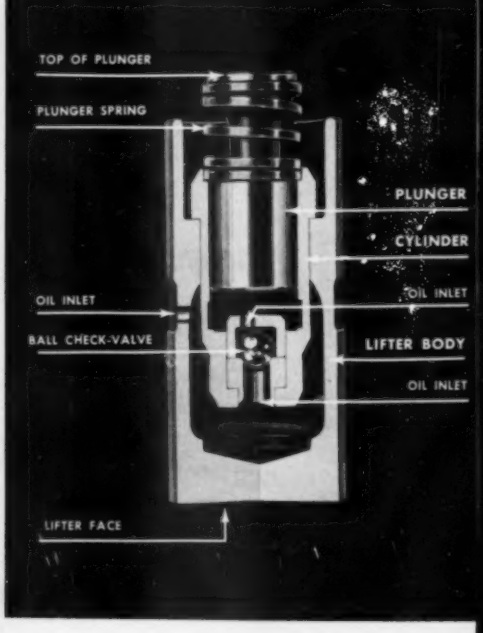
In the barrel type for overhead valve engines there are several differences in the appearance when compared to the mushroom type. The principle of operation is, however, exactly the same. This lifter



The mushroom type for L-head engines.



The mushroom type for overhead valve engines.



The barrel type for overhead valve engines.

is located between the lifting cam and the push rod. The lifter face contacts the cam, and the concave surface of the plunger operates against the push rod.

The Stub Type lifter for Overhead Valve Engines has no outer body. It consists of a hydraulic unit only. The unit is usually placed between the rocker arm and the push rod of an overhead valve engine, or between the elements of a rocker arm bridge and the valve stem. This hydraulic unit differs somewhat from those that are inserted in the lifter bodies. First, the ball check-valve is incorporated in the plunger rather than the cylinder. The spring which holds the plunger in its outer-most position is placed inside the cylinder, and can be separated from both the plunger and the cylinder. Second, oil enters through drilled holes in the plunger. The ball check-valve controls both inlets. When the check-valve is open, the oil passes into the plunger, past the check-valve and into the space in the cylinder under the plunger. When the lifter is assembled the ball is held in place by a small disk retainer. The retainer, in turn, is held in position by the pressure of the plunger spring. In disassembly the cylinder, plunger, spring retainer and ball are separated and special care must be taken to keep the parts from being lost. Leak-down takes place between the walls of the cylinder and the plunger as in all other types. Due to the difference in design, there are some servicing instructions that do not apply exactly to the stub type lifter. However, in all cases where servicing requires a slightly different method, additional instructions will be given. All other instructions will apply to the stub type as well as to the other type.

Like any other device with moving parts, hydraulic valve lifters will require occasional attention. In time, the parts of the lifter may show signs of wear, and inspection may reveal the necessity for the replacement of parts. The operation of the lifters may also be affected by external conditions. The lifter depends for its operation upon a supply of clean oil from the lubricating system. Therefore, the lifters will not operate properly if the oil is excesively dirty, if the oil LEVEL is too low, or if the oil PRESSURE is too low. Formation of carbon on the hydraulic unit is another external cause of valve lifter trouble. The following conditions of the lifter itself may cause inefficient operation: (1) Too rapid leak-down. (2) Fouled or damaged ball-check valve. (3) Badly worn or damaged face.

What Servicing Consists Of. The most important factor in the servicing of the valve lifters is CLEANLINESS. There are two kinds of cleanliness: First, your own methods of working should be orderly. The working area should be cleared of all materials and tools that will not be required in the servicing job. The working surface should be thoroughly cleaned to get rid of dirt, oil, metallic particles or other foreign matter. Second, the lifter parts should be thoroughly cleaned, not only at that point in the servicing operation that is set aside for it, but at any other time when the presence of dirt is detected. The step-by-step procedure is as follows: (1) Removal of the lifters from the engine; (2) Disassembly of the lifter; (3) Cleaning of all parts; (4) Inspection, testing and reassembling; (5) Reinstallation of the lifters in the engine; (6) Checking and adjusting the pre-starting clearance. Following, you will see, in detail, how to perform each of these six steps.

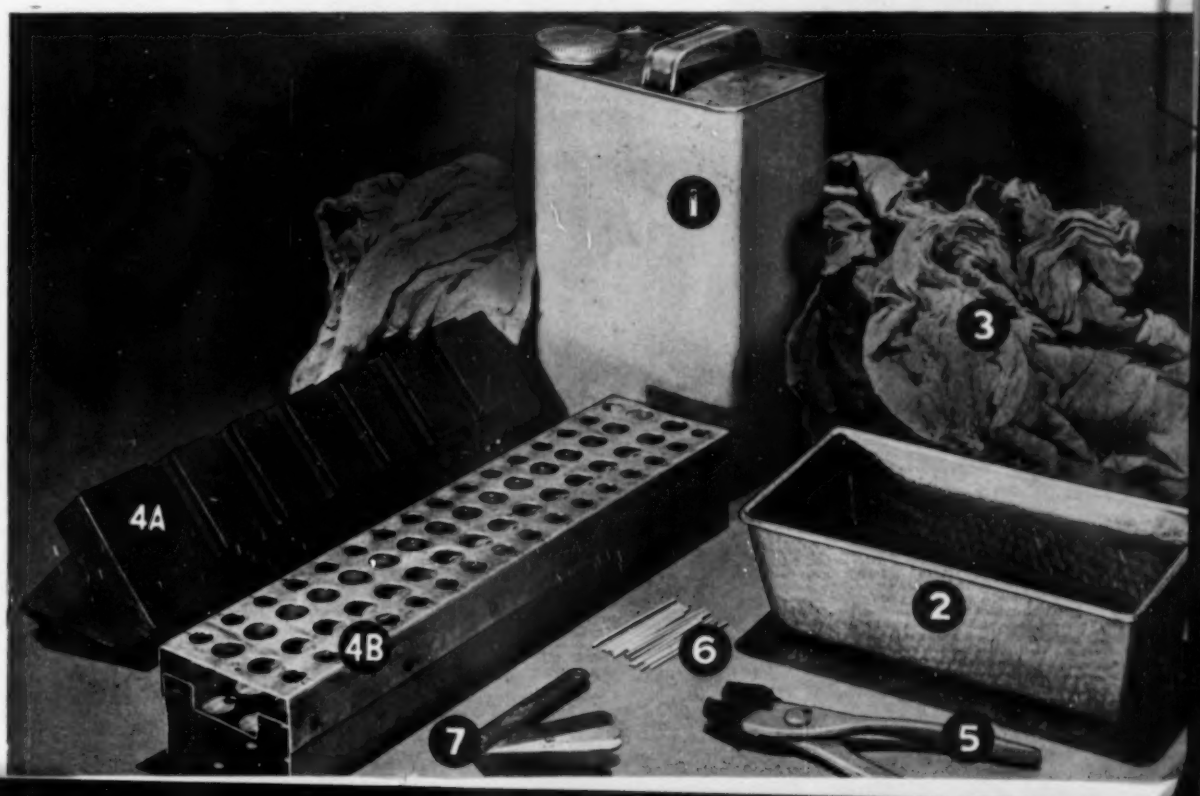
Make sure that you are equipped with the proper tools and materials. There are only a few items, but each has a definite use. If it is available at the time you need it, your job will be much easier. 1. Cleaning solvent; 2. Pan; 3. Clean cloth; 4. Two racks: (a) One rack should be provided with compartments to hold the complete lifters as they are removed from the engine. The compartment should be numbered by cylinders, so that each lifter can be returned to the cylinder from which it was removed. (b) The second rack should be provided with holes. The separate parts of the hydraulic unit will be placed in these holes so that no interchange between plungers and cylinders will take place. It is important that the parts of one unit do not get mixed up with the parts of another unit. 5. A pair of pliers, with the jaws taped to avoid metal-to-metal contact with the surfaces of the plunger. 6. Wooden sticks about the size of matches, to be used for unseating the ball check valve. 7. Feeler gauges.

Removal From the Engine. The manner in which a hydraulic lifter is installed in the engine varies with the engine and lifter design. This article deals pimarily with the servicing procedure to be followed after the lifters are removed from the engine. If it becomes a part of your job to remove the lifters from the engine, it is important that you refer to the manufacturer's handbook. It will describe in detail all the steps necessary to gain access to the lifters. In all cases, however, it is important as the lifters are removed, they should be arranged in a suitable rack marked with the cylinder numbers. This will insure the return of the lifter to the place from which it is removed.

To disassemble the lifter, remove the lifter body. It should slide out easily, but if an excessive deposit of sludge, or dirt prevents it from doing so, immerse the lifter in clean solvent and wash it until it is clean. Separate the body and the hydraulic unit and wash them thoroughly in solvent. The stub type consists of the hydraulic unit only and the above instructions do not apply as it does not have an outer body.

To disassemble the hydraulic unit note that the plunger is locked to the cylinder by the plunger spring which fits into a counter-bore in the cylinder. To remove the plunger from the cylinder, first disengage the spring. This is done by simply twisting the plunger and spring in the direction that would "wind up" the spring. Pull outward at the same time, and the plunger should come easily.

This article on the Servicing of Zero Lash Hydraulic Valve Lifters will be concluded in a subsequent issue of DIESEL PROGRESS.



Equipment necessary for servicing the hydraulic valve lifters. (1) Cleaning solvent. (2) Pan. (3) Clean cloths. (4) Two racks, one (a) with compartments and (b) one with holes. (5) A pair of pliers with jaws taped. (6) Wooden sticks about the size of matches. (7) Feeler gages.

Exchange Your Diesel Maintenance Ideas

CONDUCTED BY R. L. GREGORY

Preventive Electrical Maintenance in Diesel Plants—Part IV

FOREWORD: The following is the concluding article on the above subject, as presented by Mr. G. L. Oscarson, Chief Application Engineer of the Electric Machinery Mfg. Co., of Minneapolis, in a paper presented before the Iowa State College Diesel Power Plant conference. In the last issue we were discussing the subject of Insulation, with comments by the writer.

3. *Drying Coils:* If a machine has been flooded, or subjected to excessive moisture as a result of condensation, or from other causes, it should be dried out before applying load. Small machines may be disassembled and placed in a bake oven, maintaining a temperature of just under 100° C. Or connect a welding set to the terminals and maintain a temperature of from 75° to 80° C. as measured by a thermometer.

Large a-c generators or motors should be covered with a tarpaulin and heated by charcoal braziers, steam coils or other means, until a reading of 0.1 megohms is obtained. Do not raise the temperature above 75° to 80° C. as measured by thermometers in the windings. Use a fan to force in a small amount of fresh air under the tarpaulin, as this helps remove moisture. As soon as the insulation value reaches 0.1 megohms, apply current from a d-c welder set or from a low voltage a-c source, holding the above mentioned temperature. At an insulation value of one megohm per 1000 volts of rating, a high potential test should be applied. On new machines this is twice the rated voltage plus 1000 volts; on machines which have been in service for some time, two thirds of that value is recommended. Test field windings at 1500 volts. After the windings withstand this test voltage for one minute, normal load and voltage may be applied. Machines should never be placed in service if they will not withstand a high potential voltage test.

Writer's Comment: The foregoing methods of drying out wet units is thoroughly consistent with modern practice. However, the writer feels, that on large a-c generators, wherever possible, the old time worn short-circuit method of drying out cannot be beaten. This method of drying out consists of shorting the leads by use of a copper short-circuiting bar, rotating the unit in question at slow speed and applying energy to the field. Here, too, the unit should be completely covered by a tarpaulin and thermometers placed in contact with the core and coils, at convenient intervals around the machine. With the unit rotating at reduced speed and the field applied, the coils will gradually assume the predetermined temperature, generally 75° C. where it may be held constant by adjustment of the field. In this method of drying out the writer favors the use of a temperature chart, listing each thermometer and also the use of a graph, showing time and megger readings of each phase.

Certain features should be well carried out in this method of drying out a large unit. Temperatures should be kept constant within a couple of degrees once they have reached the predetermined value. This is done by adjustment of the applied field. Speed of the unit should be kept as near constant as possible and all readings of temperature should be recorded accurately and on time, preferably once an hour. Inspection of the thermometer readings should be made every half hour. On very wet units this dry-out procedure may take several days, before it is safe to apply the high potential test, and procedure should be as follows: When the unit has reached the predetermined temperature of say 75° C. operate it for approximately 8 hours. Then megger all leads after first removing the short-circuiting bar and record the megger readings. Do not be alarmed if these readings are very low, since that is usually the result obtained when first starting the dryout. Reconnect the short-circuiting bar and again place the unit in rotation at approximately the same speed as used in the first eight hour run, maintaining the temperature as before by the field adjustment. After eight hours more of operation, again megger the leads as before and note the insulation value. As moisture is forced from the coils this value will fluctuate, the fluctuation depending on the amount of moisture in the coils. Large units are not considered thoroughly dried out until this value ceases to fluctuate and a constant value is obtained for a 24 hour period, this value to be at least 1 megohm for each 1,000 volts rating, doubled and plus 1000 volts. When this is reached the high potential test can be applied.

4. *Insulation Resistance:* As mentioned in the section on periodical maintenance, it is desirable to measure insulation resistance of important machines at least once a year. This should be done with a 500 volt megger, or its equivalent. This is

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not a direct measure of dielectric strength nor does a high value assure that the machine is perfectly safe for operation. However, a sudden drop from a series of previously consistent readings would indicate that the condition of the insulation should be checked. Any field insulation value of less than 1 megohm, or armature value of less than 1 megohm per 1000 volts rating, at room temperature, calls for thorough cleaning and drying. As far as possible, readings should be taken under the same conditions, particularly with respect to temperature and time, as resistance drops rapidly with increasing temperature and increases with time that voltage is applied. The megger should be operated until a stable reading is reached. This may require cranking as much as ten minutes.

LOAD: A-c generator load is readily checked by the meters on the control panel. A permanent log should be kept, preferably with hourly readings. Data should include volts, amperes in all phases, kilowatts, power factor, excitation, and, if temperature detectors are installed, stator temperatures.

As covered in the periodic maintenance section, the current in induction motors should be checked periodically in all three phases with a clamp-on ammeter. Starting current and starting time also should be checked. If starting time has increased appreciably since previous test, check for excesive starting load or friction; also, check condition of cage winding. If starts regularly require over 15 seconds, be sure that the motors are designed for such duty. If starts require over 30 seconds, be sure that the meter is properly applied and secure manufacturer's recommendations as to frequency with which starts may be made. If the motor operates over a definite cycle, time and current values over one such cycle should be checked. Excessive starting load or a stalled rotor may cause more damage to the rotor bars than to the stator winding. Overload trips which protect the stator coils will not necessarily protect the cage winding. Do not depend on "feel" of core or coils to determine whether a machine is running hot. A total external temperature of 90° C. (194°F.) is permissible, and is much too hot even to touch.

If there is any question as to temperature, install thermometers so the bulbs are in contact with the core and with the coils, protecting them from direct air currents by means of cotton waste or other covering. Admittedly this is a little difficult on modern drip-proof or splash-proof motors. However, if the matter is serious enough, it would be worth while to remove the end bells, drill holes for insertion and placement of the thermometers, and reassemble the unit for operation. The characteristic odor of scorched insulation is usually present in any case of severe overheating.

BEARINGS: A common cause of machine breakdown is bearing failure. In sleeve bearing machines this may be due to excessive wear, thus permitting rubbing of the rotor on the stator. Clean oil of the viscosity specified by the manufacturer is important. If the machine must be oiled while in operation, be sure to determine beforehand the difference between running and stationary level in the sight gauge. This will prevent overoiling. In anti-

. . . *and now please turn to page 73* . . .

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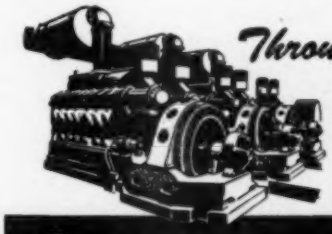

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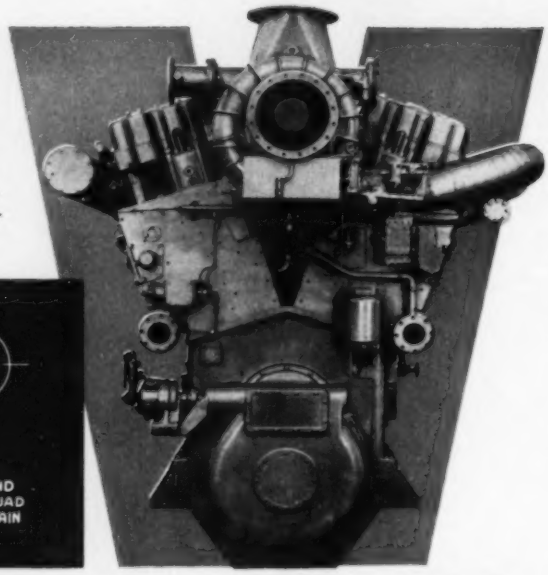

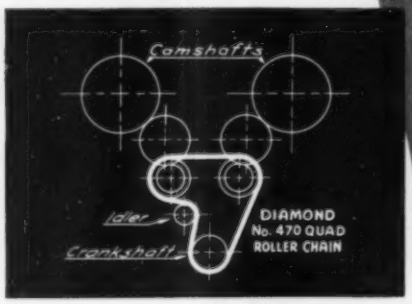

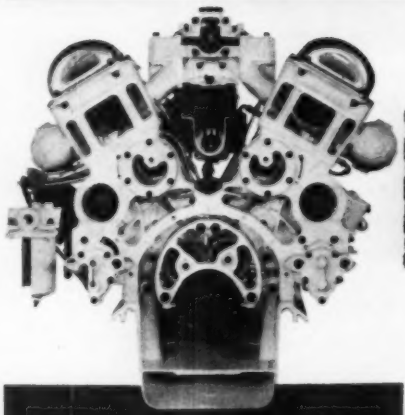

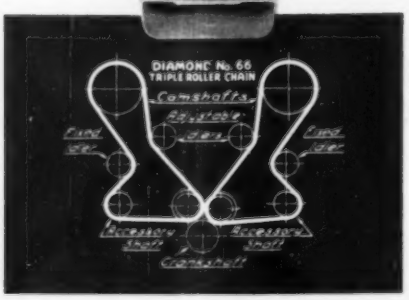

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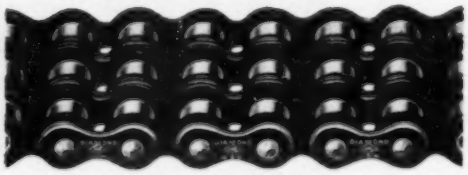

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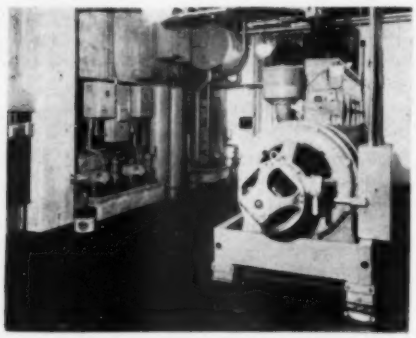
DIAMOND ROLLER CHAINS

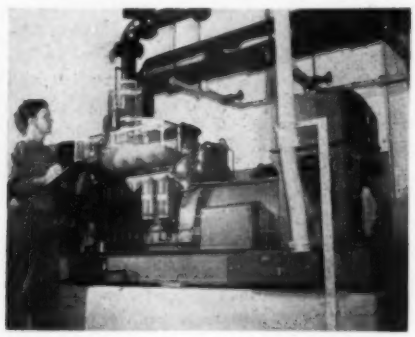
Emergency Standby Telephone Sets



Superior diesel emergency standby set in Central Office of the Southern Bell Telephone Company at Miami, Florida. Note Westinghouse generator and Air Maze intake silencer with Quincy compressors to the left.

Southern Bell Telephone Company is installing diesel engines as emergency standby sets as rapidly as equipment becomes available. The main office in Miami has an 8-cylinder Superior, 240 kw. Model VDMB-8 diesel with a Westinghouse generator, Hussman vibration eliminators, Woodward governors, Groco Lube-oil cooler, Maxim silencers as installed by Auto Marine Engineers in Miami. The branch offices have two GM "6-71" 60 kw. and a "3-71," 30 kw. and there is currently on order two GM "6-71," 60 kw. sets for the new Coral Gables office.

Switchman Everett Cline checking one of the emergency standby GM "6-71" 60 kw. diesel sets for Southern Bell Telephone Company as the hurricane warnings go up in Miami.



Service Sets for Caterpillar Tractors

The Owatonna Tool Company announces a new set of Caterpillar Tractor service tools designed especially for use with the new OTC Power-Twin Hydraulic Puller, a 17½ ton hydraulic ram. The set contains the minimum assortment of pullers, adaptors and attachments which have been tested and found essential to service Caterpillar Tractors. For complete information about OTC Caterpillar Set No. CT-644 contact your nearest OTC jobber or write to the Owatonna Tool Company, 415 Cedar Street, Owatonna, Minnesota.

DIESEL ENGINE CATALOG is now available in its Sixteenth expanded edition. Completely revised and re-edited, it is an invaluable aid to design engineers and buyers. Fully illustrated. $10.00. Order now from DIESEL PROGRESS, P.O. Box 8458, Cole Station, Los Angeles 46, California.

New Diesel Towboat

A new diesel towboat for United States Steel Company's inland river coal transportation fleet was launched recently at the Neville Island shipyard of Dravo Corporation. The vessel was named the *B. F. Fairless* in honor of the president of U. S. Steel. Mr. Fairless and his wife watched Mrs. Blaine F. Fairless, the steel executive's daughter-in-law, christen the new towboat as it slid down the ways into the Ohio River. Mrs. Benjamin F. Fairless was the sponsor's aide. After final outfitting at Dravo's shipyard, the new diesel will join U. S. Steel's river fleet moving bargeloads of coal on the Monongahela River from Western Pennsylvania mines to the company's coke plant at Clairton, Pa., the largest coking operation in the world.

The new *B. F. Fairless* will replace the 174-foot, steam-powered sternwheeler, *Clairton*, in the U. S. Steel fleet. Another sternwheeler in the fleet, named the *B. F. Fairless*, will be renamed the *Clairton*. Although 66 feet shorter in length than the *Clairton*, modern design improvements and new technical developments will enable the new towboat to handle the same towing job as the larger vessel. With two National Superior eight-cylinder supercharged diesel engines, rated at 533 horsepower each, the twin-screw *B. F. Fairless* will push the usual Monongahela River tow of six barges, totalling 5400 tons of coal. Eventual completion of new locks and dams on the Monongahela River, in a long-range program of the Corps of Engineers, will permit the use of larger barges and barge fleets in the coal trade. Most of the present locking facilities are large enough for only six barges. The towboat is the seventh of eight identical vessels built by Dravo since last December on a marine "assembly line." The last is expected to be completed before year's end. All eight towboats are designed for use in the Pittsburgh area coal trade. According to Dravo engineers, these new vessels reflect a modern economical approach to river towing operations because they combine greater pushpower with carefully designed steel hulls, and are smaller and more maneuverable than sternwheelers. One factor contributing to the additional pushpower is the use of a steel Kort Nozzle around each of the two six-foot diameter propellers on the vessel. These steel rings of airfoil cross section, built into the stern, feed larger volumes of water to the propellers, enabling them to take a bigger "bite" and develop more push. About 283,000 gallons of water a minute are supplied to each propeller through the nozzles.

Many other improvements have been incorporated in the *B. F. Fairless*, and the other seven vessels of the same class. Among these is the use of air-operated reversing gears which enable the engines to remain running in one direction while the boat goes forward or backward. On older boats it was necessary to stop the engines before reversing their direction. Controls for the main engines are located at the pilot's fingertips in the pilothouse. This eliminates the need for the customary engine room telegraph signal system and gives the pilot about as much control over the vessel as he has over an auto. Hydraulic systems are used to operate the six rudders of the boat. Two flanking rudders and one steering rudder to each propeller—combined with the Kort Nozzles—give the boat a high degree of maneuverability which enables it literally to move a string of barges sideways. Radar equipment has been installed to facilitate operations in foggy weather.

Booklet Reprinted

A booklet entitled "What Do GM Diesels Do?" which describes the many uses diesel engines fulfill in our modern economy has been reprinted by Detroit Diesel Division of General Motors. This entertaining and instructive booklet is written in rhyme and is illustrated by drawings of locomotives, buses, boats, power shovels, saw mills and many other pieces of essential equipment that are today commonly powered by diesels. Copies are available to individuals or as an educational piece for schools, libraries, reception rooms, etc. from Detroit Diesel distributors and dealers or direct from Detroit Diesel Engine Division, General Motors Corporation, Detroit 28, Michigan.

Briggs OIL CLARIFIERS ON STATIONARY-TRANSPORT-MARINE DIESELS PAY OFF BIG...

...because they keep lube and fuel oils clean--physically and chemically!

11 YEARS AGO, the Rural Cooperative Power Association of Minnesota started using Briggs clarifiers. Now ten, including 3600 H.P. diesel engines in their five operating plants, are Briggs-equipped.

Satisfaction like this proves Briggs' performance is superior. Operating men specify Briggs wherever diesel engines are used. These men know that over the years Briggs keeps lube and fuel oils clean—physically and chemically—keeps engines running better, longer.

•

Let us run a check on your present filtered oil—send a sample and full engine data. We will put it through our laboratory and give you the report. If new filters are needed, we will recommend type and size.

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★ A Briggs catalog belongs in your file—write for one TODAY!

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RIVER ROAD, WASHINGTON 16, D. C.

FOR MORE THAN A QUARTER CENTURY

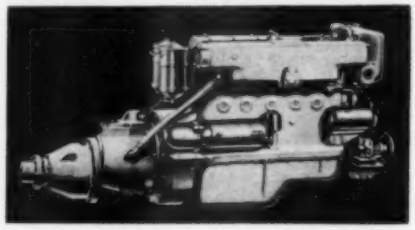
A Big Unit For A Big Job

Enos Coal Mining Company, Oakland City, Indiana, has increased production with the use of 300 hp. Model NHRBS-600 Cummins diesels in 50-ton Dart and 35-ton Mack coal haulers, despite a lengthened haul from the pits to the mine's coal washer. The Dart, shown in the photograph above, although rated at 50 tons, actually hauls closer to 60 tons—more than a railroad coal hopper car. Fuel consumption for the 300 hp. engine in this service, according to Fred Brammer, Enos' maintenance superintendent, is five gallons an hour while "lube oil consumption is negligible."

Forms Canadian Company

The Canadian business of the American Air Filter Company, Inc., Louisville, Kentucky starting this month will be handled by American Air Filter of Canada, Ltd., Montreal P.Q. Mr. Wm. G. Hole, formerly of Darling Bros. Ltd. will be in charge of all Canadian operations. Representatives will be established in the larger Canadian cities to handle the AAF line of air filters, electronic precipitators and Roto-Clone dust collectors.

Introduces New Model



Gray's new lightweight diesel, a six-cylinder model with continuous duty rating of 100 hp., shown with Paragon hydraulic reverse gear and reduction gear as built for cruiser service.

The Gray Marine Motor Company announces that production will be continued on all standard models dependent only upon availability of materials in 1952. A number of improvements have been incorporated, three models have been increased in power and one completely new engine has been developed. The new engine, shown for the first time at the New York Motor Boat Show, is a six-cylinder light-weight diesel originally developed for the U. S. Navy, delivering 100 hp. at 2200 rpm. This is a continuous duty rating. With heavy duty Paragon hydraulic reverse gear and 2:1 reduction gear as required in most cruiser installations, the unit has overall length of 69 inches and weighs only 1600 pounds, only 200 pounds heavier than the Gray gasoline engine of same piston displacement, 427 cubic inches. The diesel has valves in head and is of the 4-cycle, high speed type with aluminum housing and oil pan, Bosch fuel pump and fresh water cooling system. Before offering to the trade, the engine had over 3000 hours of testing.

Repowered Salmon Seiner

Recently repowered by a General Motors "6-110" diesel engine, the 57-foot salmon seiner *Cheryl Ann* operating in North Pacific waters has increased her cruising speed from 8 to 9.25 knots without increasing engine space. She has a payload of 18,000 red salmon and carries accommodations for a crew of ten. She is owned by Capt. John Marincovich of Everett, Washington. The new "6-110" GM diesel was installed by Evans Engine and Equipment Company of Seattle.

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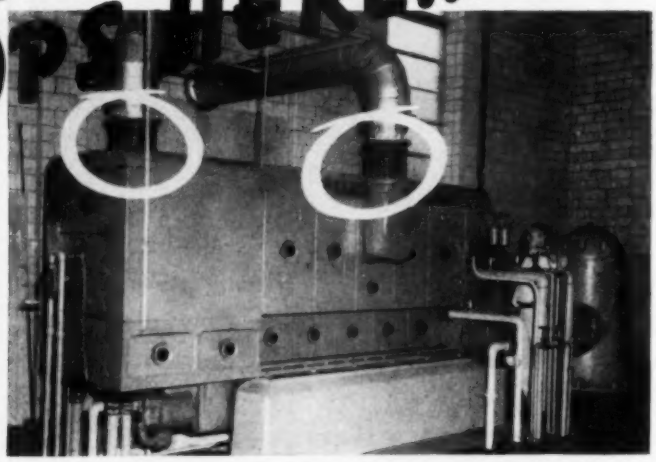
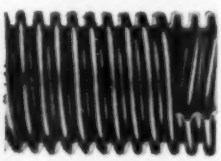
VIBRATION STOPS HERE...



...when you use CMH REX-WELD Flexible Metal Exhaust Connectors



CMH REX-WELD Flexible Exhaust Connectors are available in sizes from 1" to 24", I.D. Furnished with standard pipe nipples, couplings, fixed or floating flanges. Other types available for such services as fuel, oil, air, and lube lines.

It's easy and economical to keep engine vibration out of rigid exhaust or air intake lines with CMH Flexible Metal Exhaust Connectors. Fabricated from heavy duty corrugated tubing, they not only isolate vibration but absorb expansion and contraction and correct for misalignment as well. Because they are all-metal assemblies, they are leak-tight and require no maintenance. Engineered corrugation design gives the fatigue resistance necessary for long, dependable service. Write today for data sheets.

In the illustration above CMH REX-WELD Connectors, Type RW-75, are used in the exhaust and air intake lines of this Fairbanks-Morse Diesel, one of three installed in the municipal pumping station at Corpus Christi, Texas.

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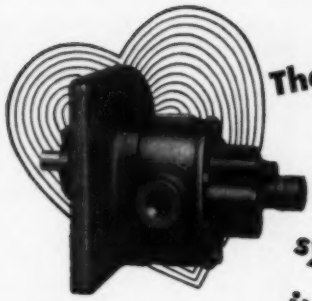

The HEART of a diesel lubricating system is its PUMP

Rotary geared pump with special flange mounting becomes integral part of diesel engine when installed. Note opening above relief valve for tachometer.

Modern diesel operation generally requires a pressure lubricating system — and the vital element is the pump. Thousands of Brown & Sharpe pumps are now providing reliable service month after month without interruption, for lubrication, transfer, or booster systems. Available with various types of flange mountings and special internal construction to meet specific requirements. Write for catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

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DC *Continuous Duty*

6, 12, 24, 32 VOLTS • 10 LB. PULL OVER ½"

For operating throttles, chokes, fuel pump racks, anti-dieseling devices, or any application not requiring more than 10 lbs. pull over ½" stroke. Ruggedly constructed and entirely enclosed for dust and splash proof operation. It is furnished with a mounting bracket and threaded plunger for connecting to operating linkage.

Overall length, plunger out, 4⅛". Overall width of mounting ears 3⅜". Weight 2½ lbs. Special plungers can be supplied if required.

Automatic Engine Control Equipment

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PROTECT YOUR ENGINE AGAINST SLUDGE with THE wixkuler

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Easily installed inside the craft for longer engine life.

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Sweeney POWERENCH TOOLS

for diesel engine maintenance

NO. 220-4 POWERENCH —as pictured with Torque-indicator for Electro-Motive Crab Nuts...provides 7.2 to 1 power ratio...saves up to 80% man hours.

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B. K. SWEENEY MFG. CO., DENVER 17, COLO.

Piston Ring Catalog

A new, colorful and easily read catalog has been issued by the Safety Seal Piston Ring Company of Fort Worth, Texas. Not only does the catalog describe the Safety Seal line of industrial rings but it also contains operating data and engineering tables that make it a useful reference book for operating engineers and purchasing agents. Ten different types of rings up to 32-inches in diameter are described. In addition, a conversion table and decimal equivalent chart, a radial thickness chart, a description of dowel pin mills, and a table giving weights of the rings are included. The catalog was prepared under the supervision of Wm. S. Baker, chief engineer of the organization and who is well-known in the piston ring field. Copies of the catalog are obtainable upon request to the company. Address letters to Safety Seal Piston Ring Company, P.O. Box 106, Fort Worth, Texas.

Caterpillar Dealership

Columbia Tractor Company, with headquarters at Wenatchee, Washington and branches at Waterville and Coulee City, Washington, has been appointed to a Caterpillar dealership, it has been announced by B. L. Hagglund, manager western sales division, Caterpillar Tractor Company. Principals of Columbia Tractor are Paul Isaacson, Ted Isaacson and Ed Murray. All three were previously associated with Young Iron Works, Seattle. The new company will handle the full line of Caterpillar, John Deere and allied manufacturer equipment and will serve Okanogan, Chelan, Douglas and Grant counties in Washington.

Scale Model of Diesel Locomotive Presented

Hon. Delos W. Rentzel, Under Secretary of Commerce for Transportation examines the exact scale model of a 6,000 hp. GM diesel freight locomotive.

A quarter-inch scale model exactly reproducing a 6000 horsepower General Motors diesel freight locomotive has been presented to the Hon. Delos W. Rentzel, Under-Secretary of Commerce for Transportation and added to the collection of models of major means of public transportation in his office in Washington. The model was placed in the transportation exhibit by Mr. R. L. Terrell, of New York, assistant eastern regional manager of Electro-Motive Division of General Motors. In accepting the model Mr. Rentzel said: "This diesel freight locomotive symbolizes the latest type of motive power to which American railroads are turning to speed up the movement of materials and commodities to producers and consumers in the far-flung corners of our nation. It is further evidence of the progressive attitude of the railroad industry toward getting its physical plant in readiness to handle peak loads now and in the future. In the event our nation is called upon to fully mobilize its resources and productivity, the diesel type locomotive will be able to move more tonnage with less fuel, thus contributing to a substantial saving. It may be truthfully said that the diesel locomotive has been the major contribution needed by the railroads to meet rising costs in the past decade and remain effectively and progressively private enterprise."

CHECK THESE ADVANTAGES IN COOLING DIESELS—

with "Buffalo" EVAPORATIVE COOLERS

✓ Water jacket temperatures kept to within a very few degrees of setting

✓ Closed system cooling means CLEAN cooling!

✓ Uses little water!

✓ Minimum space required!

✓ Easy Operation and Maintenance!

✓ Indoor or outdoor installation!

Quality Construction Insures Performance!

Look at this quality construction in "Buffalo" Evaporative Coolers — efficient Aerofin spiral-fin cooling coils — efficient "Buffalo" wheel, hollow-shaft "mixed-flow" fans for quiet, high volume air delivery — durable "Buffalo" pumps — non-clogging spray nozzles also by "Buffalo" — construction that means dependable operation and freedom from troubles, year after year. WRITE FOR BULLETIN 3666 and check all specifications, including the 3-sectional design that permits moving units thru standard doorways!

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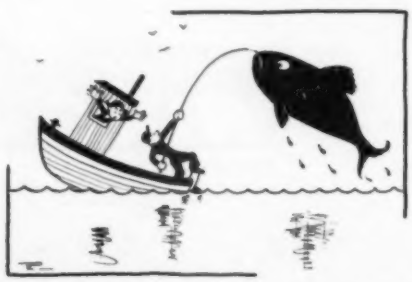
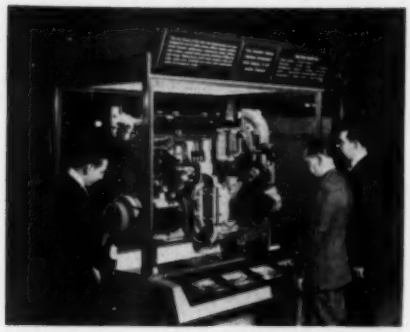
EVAPORATIVE COOLERS AND AXIAL FLOW FANS FOR COOLING MOBILE AND STATIONARY DIESELS



Detroit Diesel Display at Motorboat Show



Detroit Diesel's glass-enclosed motorized cutaway of the "6-100" marine diesel engine.

The General Motors Styling Section has designed the elements used in Detroit Diesel Division's marine diesel display at the 1952 National Motorboat Show in New York City. The exhibit includes a beautifully finished glass-enclosed motorized cutaway of the "6-110" 275 hp. marine diesel which was first introduced to the public at the 1951 show. Other "6-110" engines on display include a model 62200 RA marine propulsion unit and a model 62501 heat-exchanger cooled marine generator set made up of a GM "6-110" diesel and a single-bearing Delco generator. The popular Series 71 diesel displayed include a 4-cylinder Model 4071A engine and a matched pair of 200 horsepower marine propulsion units, Models 6071A and 6072A with right and left hand rotation. The engines are in dove grey enamel set off by chromium-plated rocker-arm covers and piping, with black enameled electric starters and generators. Detroit Diesel's parts department also has a display covering GM marine diesel "factory engineered" parts.

This will be the sixth consecutive year in which Detroit Diesel's display is located in space L on the main floor of the show building. The 1300 square feet of display space is comfortably filled with interesting exhibits of diesel engines and auxiliaries for pleasure craft, work-boats, and fishing boats.

Split-Flange Type Clamp

The Anchor Coupling Company, Inc. of Libertyville, Illinois, has announced the development of a new split-flange type clamp. This clamp design represents a new development for the hydraulic field. Its design makes it easy to use, eliminates threaded joints and prevents leaks. A wide selection of sizes is available for use with either clamp or pressed-on type couplings in straight or angle styles for one or two-wire braid hose from ½-inch ID through 2-inch ID. The clamp can be used for high, medium, or low pressure service, suction return lines, etc. The seal consists of an O-ring which has proven successful in many hydraulic applications. The seal eliminates the need for tapered threads. For complete details on sizes and types available write Anchor Coupling Company, Libertyville, Illinois.

Improved Jaquet Speed Indicator

A Bulletin No. 735 has been issued by Herman H. Sticht Company, Inc., 27 Park Place, New York, N.Y. This bulletin shows the new improved Jaquet Speed Indicator (chronometric type tachometer) with new ball bearing spindle and new dial with extra scale divisions which greatly increases readability. The guaranteed accuracy of this speed indicator which is marketed by Herman H. Sticht Company, Inc., is .5%. The bulletin shows four different models covering extreme low speeds with readings possible to .02 of one rpm. per division in the Catalow Model No. 2304, and allowing maximum readings to be taken up to 100,000 rpm. in the Catalog No. 2300 Velox Indicator. The instruments are furnished in three different styles of cases with different sets of accessories to suit many different applications. Being of the chronometric type, these speed indicators measure rpm. over a fixed period of three and six seconds respectively, after which the hands stop. The indicators are small in size (pocket size) and are ideal for spot checks of rpm. or feet per minute in all cases where speeds remain fairly constant over three to six seconds. The Bulletin No. 735 is available on request.

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EASY TO EQUIP MANY BARGES WITH COMPACT MONEY-SAVING OUTBOARD PROPULSION

HARBORMASTER Outboard Units Are Easy To Install On Barges, And Cut Your Towing Costs To A Minimum

THE easiest and quickest way to cut your barge towing costs is to install the Harbormaster Outboard Propulsion And Steering Unit on many special purpose barges such as crane barges, flats, lighters, and dredges.

The Harbormaster Unit is like a "giant portable" . . . easy to install, operate, maintain and service. What's more, the Harbormaster gives you the greatly increased flexibility of operation you need . . . in barges self-powered with *outboard* power.

You get the ultimate in maneuverability and economy with the Harbormaster Outboard Propulsion And Steering Unit. It allows you to steer instantly with full power in any direction through the M&T 360° patented method of Propellor Thrust Steering Control. You get big savings in fuel because you have more thrust per horsepower.

Important Features that save time and money include exclusive 180° Elevating Mechanism which allows 1-man operator to easily maintain and service the equipment; and Patented Shear Pin, which automatically shears off should underwater assembly strike a submerged obstacle . . . thus opening up vast new shallow water fields to continuous, reliable operation. Harbormaster models, for all marine purposes, are available in sizes from 20 to 300 h.p., gas or diesel power.

You'll find detailed data and valuable information in our comprehensive catalog containing over 70 photos and diagrams. Gladly sent you on request, whether you have immediate or future use for Harbormaster units. Why not write for the catalog now so that you will have full information on file?

Murray & Tregurtha
HARBORMASTER
Outboard Propulsion And Steering Units

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Please send catalog, without obligation, covering the HARBORMASTER Outboard Propulsion And Steering Unit.

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Company.....

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Outboard Propulsion . . . Heavy Duty Power With Outboard Maneuverability

Supervising

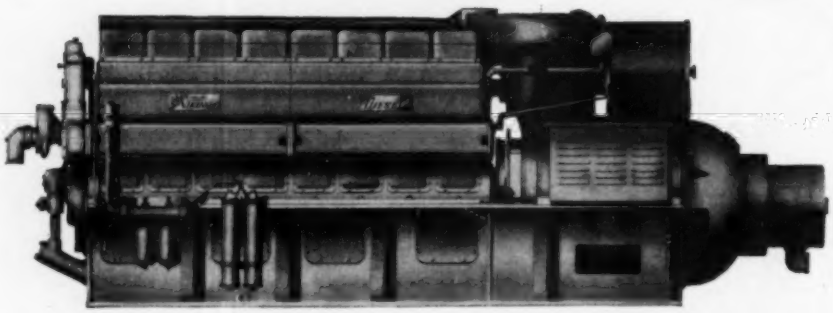
. . . continued from page 54 . . .

raisers" and starting points for cracks. The weakness of the shaft at the counterbored holes was demonstrated, not only by the starting point at the crack that led to the final failure, but also by other incipient cracks found at counterbores on the opposite side of the shaft.

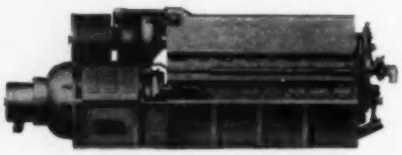
It is concluded that no one factor was sufficient to have caused this accident, but that the method of counterboring the bolt holes for the coupling, some torsional stresses, and a degree of misalignment, all played a part in the failure.

The foregoing material and photographs were furnished to DIESEL PROGRESS through the courtesy of the Hartford Steam Boiler Inspection and Insurance Company, by Mr. A. G. Jeters. It is printed in this section to again call to the attention of our readers, that although it was a very unusual accident, it proves the old adage that "What can happen will happen" and though we are ever so vigilant in the inspection of our units, we cannot overdo or relax upon constant inspection and careful checking of the units. It is proper to assume that the cracks which developed and eventually caused this failure, did not so develop within a short period of time, but had at the start been developing over a period of some time, until the shaft became so weak that the eventual failure came hurriedly. It also proves that there are conditions, metallurgically, and otherwise, which even the most careful design will not take care of, and that occasionally one will find a piece of equipment that will develop failures of this and other types, for no one reason at all, but from a combination of causes.

Sterling Viking Diesels definitely lower costs of power production



Model VDS-8S, 600 KW Generator Set. Viking Diesel "packaged unit" generator sets are available in 6 and 8 cylinder models. Bulletins 1024 and 1028 contain sectional views, fuel consumption curves, engineering and installation details. Sent on request.



We have the evidenced facts to show any user of diesel electric generator sets that the newly engineered Sterling Vikings can cut KW hour production costs as much as 50 per cent.

Fuel consumption, engine weight, compactness, housing, installation, parts cost, general maintenance—all are factors in the service worth of a generator set. On every point Vikings offer proven advantages confirmed by comparison. In diesel engineering, Sterling has come up with design developments that have the industry talking. We would like to give you this story of lower power costs first hand. Write us for latest Sterling Viking Diesel literature.

Sterling

MARINE AND INDUSTRIAL

ENGINES

● Depend upon Sterling Diesel Power for Locomotives, Generator Sets, Commercial and Fishing Craft, Lift Bridges, Ventilating Systems, Drilling Rigs, Etc.

Diesel, Gasoline, Gas — 4, 6 and 8 cylinder — 30 HP to 1,000 HP

STERLING ENGINE COMPANY • 1270 Niagara Street • Telephone Lincoln 0382 • Buffalo 13, New York

New Shut-Off Valve

Production of a new shut-off valve designed especially to protect gauges in both pneumatic and hydraulic systems is announced by Sprague Engineering & Sales Corp., Gardena, California. The shut-off automatically cuts out gauges from the system when pressure goes beyond their operating limits, thus protecting them from damage. It automatically opens the gauge to the system when the pressure is again within operating range of the gauge. The Sprague shut-off is available for low pressure—30, 60, 100, 200 and 300 psi. and high pressure—500, 1000, 1500, 2000, 2500, 3000 and 5000 psi. Positive opening and closing action of the Sprague Gauge Shut-Off eliminates the need for a relief valve and a manually operated gauge shut-off valve. When installed in a hydraulic system with multiple gauges of various ranges, the shut-offs save man hours spent in manipulating manual controls. A compression spring controls the pressure shut-off point. Minor changes or adjustments may be made by adjusting the screw positioned at one end of the shut-off. Major changes of pressure shut-off point are possible by simply replacing the compression spring. They are supplied with standard pipe thread connections. The connection to the system is made at the end of shut-off, ¼-inch pipe thread. Connection to the gauge is made on the side of shut-off, ¼-inch pipe thread.

Mack Appointment

D. C. Wheeler

D. C. Wheeler, vice president of the Mack Motor Truck Corporation, has been appointed general manager of the company's central division, according to an announcement by H. W. Dodge, executive vice president. Mr. Wheeler joined Mack in 1939 as manager of the company's Oklahoma City district following his resignation as vice president of the Reo Sales Corporation. Made manager of Mack's Dallas district in 1942, Mr. Wheeler was elected a vice president of the company in 1949 and named manager of its southwestern division with his offices remaining in Dallas. In his new position, he will direct Mack's sales activities in Illinois, Ohio, Iowa, Michigan, Indiana, Missouri, Kentucky and Minnesota. He will headquarter in Mack's Chicago offices. Garner L. Davis has been named to succeed Mr. Wheeler as Mack's southwestern division manager. During his six years with the company, he has been salesman at the Houston district and manager of its Oklahoma City, Dallas and Houston districts, the last of which he relinquishes to assume his new duties.

Florida Diesel News

By E. F. DENNIS

FOR MIAMI WATER WORKS, 8—"G.M.-71" diesels, at their new water pumping plant; used in tandem, each set is hooked up to an angle drive, deep well turbine, Cooke pump, 18-inch 2 stage, 6.2 M.C.D. 45 foot head and 180 head, General Motors, Cleveland Diesel Engine Division, Miami; supplied the engines. On contract for delivery in February are 3 more "G.M.-71's" and pumps to suit, plus 4 Worthingtons 800 hp. each, some time in 1952.

PURCHASED BY Abaco Lumber Company 2 International Harvester diesel tractors, a T.D. 6 and T.D. 9, for logging on Abaco Island in Bahamas. Also have several T.D. 24 and T.D. 18 dozers doing road work; supplied by Florida-Georgia Tractor Co., Miami.

BAHAMA Island's crawfish boats re-powered with Gray Marine "G.M. 6-71" Borg Warner 1½:1 reduction gears, A.C. fuel and lub-oil filters, Capt. Flowers on *Baily Town* and Capt. Russell owner and skipper of *Strange Girl;* at the docks of Auto Marine Engineers of Miami.

FOR MERCY HOSPITAL: A Caterpillar D 364-260 hp. Woodward U.G.8 governor General Electric, 147- kw., 510 amp. generator at 1200 rpm., Ross heat exchanger, water from a 4 inch, 60 foot, well with a Jager self priming pump, Burgess snubbers, Korfund vibration eliminators. Engineered by Shelly Tractor of Miami.

MAJOR OVERHAUL: a 6 cyl. Buda model 844 165 hp. Twin Disc clutch 2:1 reduction gears, Delco Remy generator and starter for 70 ft. *Grayline #2,* sightseeing boat at yards of Miami Marine Engineers.

FROM BARACOA, CUBA, the M.V. *Countess* re-powered by Auto Marine Engineers of Miami, with a Superior model MRD8 150 hp. Snow Nabstedt 3:1, 48x36 Columbia propeller, Twin Disc front power take-off, a Lister Blackstone model C.D. 5 kw., owned by Manola Diaz.

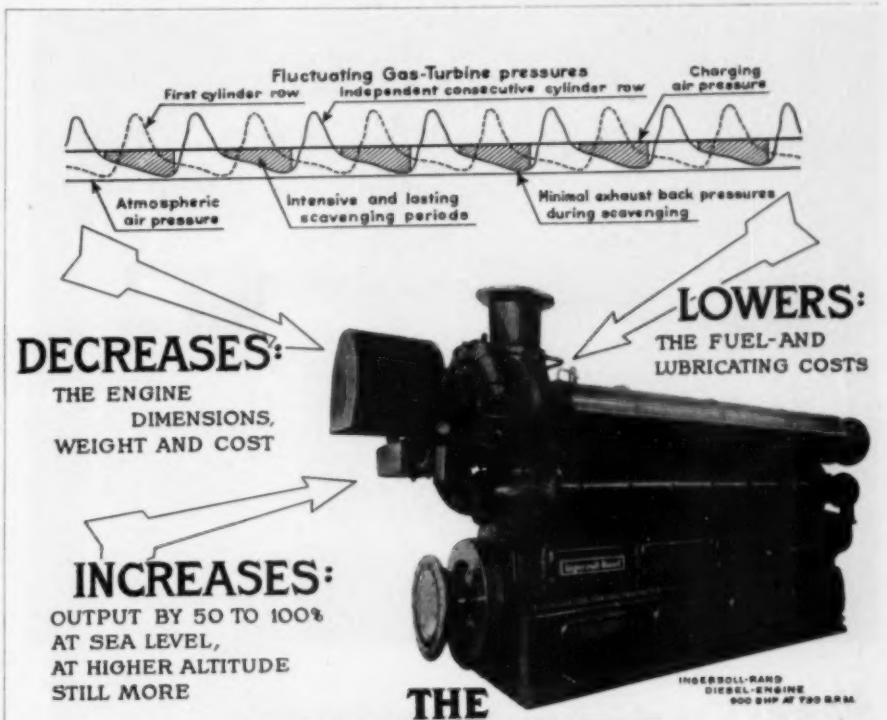
RINGLING BROS. Barnum and Bailey Circus, 4 "G.M. 6-71," 60 kw., 60 cycle, ac. 120 volt G.E. generators, Young radiators, 60 injectors, Delco Remy 24-volt system, Woodward governors original 90 series, supplied by Cleveland Diesel Div., Cleveland, Ohio. Along with 2 Cummins diesels model "H" 150 hp. General Electric 50 kw. generators, Woodward governors, Leece-Neville starters and generators supplied by Cummins Diesel Engines of Florida, Coral Gables. Records checked and reveal they use Texaco 303-SAE#30 lube-oil and the Cummins diesels have only one major overhaul in 10 years. All six engines ran approximately 12,600 hours this season with only a few minor adjustments.

THE *Sunset* re-powered by Miami Marine Engineers with 2 Model 6-298 Kermath diesels, Snow Nabstedt 2½:1 reduction gears, Bosch fuel system, Delco Remy starter and generators.

BELEM, BRAZIL, Grande Hotel, 3 "G.M. 6-71" 60 kw. diesels, two for general use including elevators, huge refrigerator and deep freeze, and the third for stand-by.

SCIENTISTS and fishermen convene. Distinguished scientists from the United States various Caribbean nations and the Bahamas participated in the 4th annual "Gulf and Caribbean Fisheries Institute" held at Miami Beach Nov. 12-16 in the San Souci Hotel. Sponsored by the commercial fishing industry in cooperation with the University of Miami's marine laboratory, this 5 day event attracted over 200 fishermen. Chief discussion was the discovery of new shrimp beds which have brought a new multi-million dollar business to the Gulf Coast.

EARLY RESERVATIONS for booth and boat space for the eleventh annual Miami Boat Show, to be held at Dinner Key Auditorium, Feb. 15 through Feb. 20, shows that Diesel Engine Manufacturers will play a prominent part in the marine display. Brochures for the 1952 event were mailed on October 15th and the early response from former and many new exhibitors exceed that of any previous years, according to Peggy Leyshon, executive director. Side by side with exhibits by Matthews Cruisers, Chris Craft, Dumphy, Owens, Lyman, Wheeler and many others will be Cleveland Diesel Engine Co., of General Motors, P & H Harnischfeger Corp., Gray Diesel Engine Corp., Superior Diesel Engine Co., and Lister Blackstone Co.


Fluctuating Gas-Turbine pressures
First cylinder row
Independent consecutive cylinder row
Charging air pressure
Atmospheric air pressure
Intensive and lasting scavenging periods
Minimal exhaust back pressures during scavenging
DECREASES:
THE ENGINE DIMENSIONS, WEIGHT AND COST
LOWERS:
THE FUEL-AND LUBRICATING COSTS
INCREASES:
OUTPUT BY 50 TO 100% AT SEA LEVEL, AT HIGHER ALTITUDE STILL MORE
INGERSOLL-RAND DIESEL-ENGINE 900 BHP AT 720 R.P.M.

THE BUCHI SYSTEM OF Turbocharging

DR. ALFRED J. BUCHI

ENGINEERING OFFICE • WINTERTHUR • SWITZERLAND

LICENSORS AND CONSULTING ENGINEERS FOR TURBOCHARGING OF NEW AND EXISTING INTERNAL COMBUSTION ENGINES

U. S. OFFICE: 520 MUNSEY BUILDING WASHINGTON 4, D.C.

Firms in U. S. building Oil Engines Exhaust-turbocharged on the Buchi-System:

American Locomotive Co., Diesel Engines and Turbochargers • Baldwin-Lima-Hamilton Corp. • Buckeye Machine Co. • Chicago Pneumatic Tool Co. • Cooper-Bessemer Corp. • Elliott Co. (Turbochargers only) • Enterprise Engine & Machinery Co. • Fulton Iron Works Co. • Ingersoll-Rand Co. • National Supply Co. (Superior and Atlas Engines) • Nordberg Mfg. Co. • Sterling Engine Co. • Union Diesel Engine Co. • Washington Iron Works • Worthington Pump and Machinery Corp.

New Air Compressor

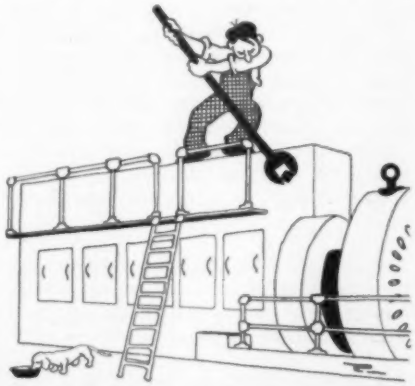
Now available for highway, heavy construction contractors and quarry operators is the new Standard Model 365 air compressor manufactured by the Jaeger Machine Company, Columbus, Ohio, and featuring a Cummins diesel. The compressor, rated at 365 cubic feet of air per minute at 100 pounds per square inch pressure, utilizes a 165 hp. model HRBI-600 Cummins engine for its power plant. Engine operating speed of the diesel-compressor unit is 1240 rpm. Both the Cummins diesel and Jaeger compressor are mounted on structurally welded main frames. The heavy duty wagon has an "auto-steer" front axle, and can be hauled safely at 35 miles per hour over rough roads. Steel wheels or skid mountings are also available. Length of the complete rubber-tired unit is 12 feet, 3 inches; width—5 feet, 10½ inches; height—6 feet, 9 inches; and weight—8,500 pounds. The 165 hp. model HRBI-600 Cummins is a 6-cylinder full diesel, with a displacement of 743 cubic inches; a compression ratio of 15.5 to 1; a maximum rated rpm. of 1800; and a net weight of 2,365 pounds.

Log Towing Tug

"Boiling Along" is *Timber*, 31 foot steel towboat owned by G. F. Reid of Vancouver, B.C. *Timber* is engaged in heavy log towing in the Fraser River area adjacent to Vancouver. Her new 6-cylinder 6-110 General Motors diesel, turning a 48-inch by 21-inch propeller through 3:1 reduction gear is one of quite a few similar installations made recently in towboats by Hoffars Ltd., GM diesel distributors in Vancouver.

Names New Sales Manager

Herman B. Robbins has been named sales manager of the Generator Set Division of John Reiner & Company, according to an announcement made by John Merk, general manager of the company. The Generator Set Division handles the distribution and sales of D. W. Onan generator sets as well as the John Reiner & Company line of diesel and gasoline generator sets, marine auxiliaries and oil field utility units. In addition to his regular duties, Mr. Robbins will also be in charge of all export activities of the company. He will travel extensively in this country and abroad to survey market conditions and seek additional domestic dealer and export distributor outlets.



Newest in Diesel Design has *Latest* in Automatic Protection

... by Alnor

Recently developed radial Diesel has the industry talking about the newest in engine design—the latest in automatic protection.

From the first, these new engines have been protected by Alnor Pyrotacs that continually monitor exhaust temperatures . . . automatically check all cylinders, anticipate trouble from overloading or lubrication breakdown.

You too will find many applications for the Alnor Pyrotac and motor driven switch that bring you these exclusive features:

- Constant monitoring of up to 20 temperature points.
- Automatic shutdown when maximum safe temperature is reached.
- Switch pointer stops at position of excessive temperature.
- Both faces easily read from 20 feet—for minimum supervision.
- All circuits non-electronic—need no tuning.
- Switch cycle can be interrupted for close reading of each temperature.

Such constant, automatic protection increases efficiency and operating economy on all engines—reduces maintenance time and expense to a minimum.

Ask your Alnor representative for assistance in solving your pyrometer problems today! He can help you select the right pyrometer and thermocouples for maximum protection of your engine installation. Illinois Testing Laboratories, Inc., Rm. 507, 420 N. La Salle Street, Chicago 10, Ill.

Alnor PRECISION INSTRUMENTS FOR EVERY INDUSTRY

ILLINOIS TESTING LABORATORIES, INC.

Room 508, 420 N. La Salle Street • Chicago 10, Illinois

Maintenance

. . . continued from page 63 . . .

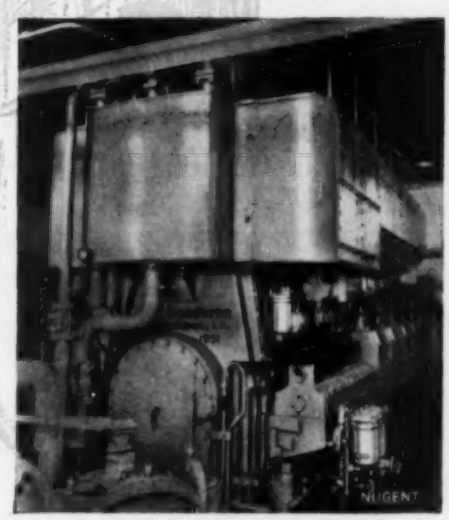
friction bearing machines the trouble will probably be evidenced by complete failure of one or more balls or rollers. These bearings should be greased as recommended. Purging out some of the old grease at each greasing is desirable. Over greasing is worse than under greasing. Sleeve bearings may safely operate at 80° C. If high temperature grease is used, anti-friction bearings will do likewise. With normal grease a high of 65° C. is recommended. If high bearing temperatures persist, be sure to check for coupling misalignment in coupled units or for excessive belt tension in belted units.

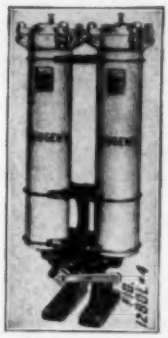
COMMUTATION: Commutation of d-c machines is far from being an exact science. Contrary to what might be expected, a nice shiny commutator is not to be desired. Such a commutator has a low resistance surface contact with the brushes, permitting high circulating currents at the surface, and possible resultant heating. A copper oxide coating, resulting in a uniform glossy chocolate brown color, is to be desired. The thickness of this coating should be such that a brush drop of 1½ to 2½ volts is obtained. Formation of such a coating depends on many factors, such as grade of brush, brush pressure, current density, humidity and presence of chemical vapors. Such a film serves, in effect, as a lubricating medium and results in slow brush wear. A streaked commutator indicates a breakdown of this film. Streaking is usually due to "picking" or imbedding particles of copper in the brush face. Resistance at the point of film breakdown is lowered and the brush will carry more than its share of the current. More "picking" results until the commutator becomes grooved.

If a streaking occurs, the commutator should be cleaned with a stone and a new uniform film permitted to form. It may be necessary to sand clean the faces of the brushes to remove the abrasive surface. If actual grooving occurs it will probably be necessary to turn or grind the commutator. Occasionally "feathering" or dragging small slivers of copper from one commutator bar to the next occurs. Under aggravated conditions, this may short circuit across the mica spacers to the next bar. This is probably due to hammering of the brush on the bar. Remove such slivers with a sharp tool and check for any abnormal conditions such as excessive surface film, excessive brush pressure, or brushes with too abrasive action. The grade of brush must often be determined by experiment. Sometimes a combination of normal brushes and abrasive brushes is required to prevent formation of too thick a film. If abrasive brushes are used, all the brushes in one brushholder arm must be of the same grade. Brushes should be staggered in pairs, i.e., one positive set and one negative set of brushes should be slightly offset with respect to the next two sets of brushes so the entire surface of the commutator is in contact with both the negative and positive brushes at some time. Brush pressure should be about 2½ to 3 psi. Too much brush tension may result in heating and noise due to friction. Too little pressure will cause noise on account of chattering. Brushes are usually selected for a density of 55 amps per square inch at full load. They will operate well, down to about 35 amps per square inch. If the machine must operate

. . . and now please turn to page 81 . . .

Down in the bayous
NUGENT FILTERS help guard
Houma's power supply





Above — Nugent filters of the type used for actuator oil at Houma. *Right* — Fuel filter of the type used for pilot diesel fuel.

DEEP in Louisiana's beautiful bayou country, the City of Houma has recently passed the second anniversary of its diesel power plant . . . and, as is true in so many installations where dependability and continuity of service is important, Nugent Filters are used to help protect the engines. The engines are three 2000 H.P. Nordberg gas burning diesels . . . the Nugent filters are used to remove impurities from pilot fuel oil and actuator oil.

Wherever engines must give long dependable service, Nugent filtering is a must. Offering more effective filtering at lower cost, Nugent Filters are available in a complete range of sizes and types to meet every filtering need. Write for full data, outlining your filtering requirements.

Wm. W. Nugent & Co., Inc.
415 N. Hermitage Ave. CHICAGO 22, ILLINOIS

Elected Waukesha Director

Charles E. Nelson

The Board of Directors of the Waukesha Motor Company has announced the election of Mr. Charles E. Nelson, Jr. as a director of the company. Mr. Nelson, also vice-president, production, entered the Waukesha Motor organization in 1929 following several years as state wholesale representative for a major motor car manufacturer. His earliest activities with the company were connected with the financial department and led to his appointment in 1933 as secretary and treasurer of the Fageol Truck and Motor Coach Company of Oakland, California, at that time a subsidiary of the Waukesha Motor Company. Returning to Waukesha in 1934, he became factory production manager and in 1936 was made director of purchases and production planning. In 1947 he was appointed assistant to the president, and in February 1949 he was appointed vice-president in charge of production. Mr. Nelson is widely known in industrial purchasing, production, and management fields. He is a past president of the Milwaukee chapter of the National Office Management Association, a member of the Milwaukee Association of Purchasing Agents, and a member of the Army Ordnance Association. He is active on the Executive Committee of the Internal Combustion Engine Institute and on the Munitions Board and National Production Authority committees on Internal Combustion Engines. For a number of years he served on the National Committee on Economic Development.

Acquires Exclusive U.S. Manufacturing and Sales Rights of English Diesel

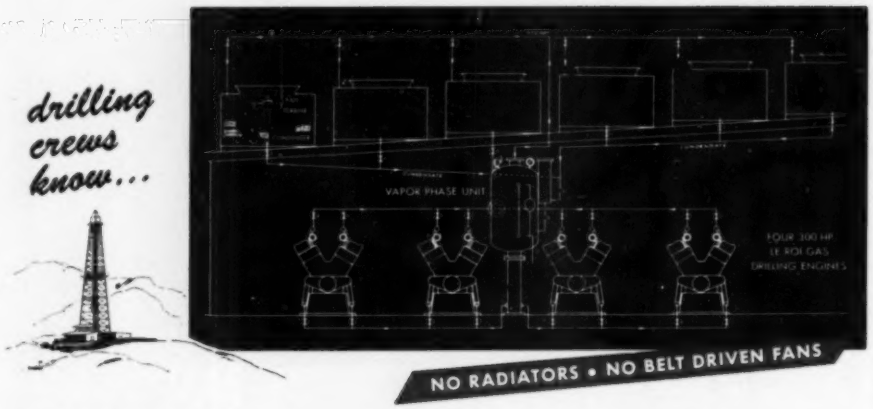
The Twin Coach Company has announced that it has entered into a cooperative agreement with Leyland Motors (Canada) whereby the latter's plant facilities at Longueuil, Quebec, will be used for the manufacture of Twin Coach buses and trolley coaches. This agreement was entered into at the same time Twin Coach acquired exclusive United States manufacturing and sales rights to the complete line of Leyland diesels produced by Leyland Motors Limited of England. The arrangement was negotiated by Mr. J. L. Fageol, Twin Coach president and the Honorable Henry Spurrier, Leyland executive director.

These engines will be sold in this country under the name of Fageol-Leyland and will be completely "Americanized" with SAE standard threads incorporated into the design of the engines as well as in all accessories and fittings. Engineering of the American production engines will be handled by Fageol Products Company, Kent, Ohio, a Twin Coach subsidiary which currently manufactures Fageol gasoline and propane engines. All engines covered by the Fageol-Leyland agreement are of postwar design and incorporate many features which result in low weight per horsepower, in addition to highly efficient operation. It covers a full line of engine models with power ranges from 90 to 200 hp.

The Canadian agreement was negotiated by Mr. Fageol with Mr. Kenneth Shirlaw, general manager of the Canadian organization and was confirmed by Mr. Spurrier. It is expected that the first Twin Coach vehicles produced in the Leyland plant will be available during the initial quarter of 1952. Twin Coach production at this plant will be supervised by Mr. A. E. Golem, formerly plant manager of Twin Coach of Canada, Ltd. Mr. Golem will work under the direction of Mr. Earl W. Lenz, Twin Coach vice president in charge of bus production. Twin Coach will maintain its own Canadian engineering and design divisions but will utilize all Leyland production facilities and labor. Mr. George S. Gray, vice president in charge of sales of Twin Coach of Canada, Ltd., will continue in that position.

"Hell hath no fury like a ~~woman scorned~~ boiling radiator"

drilling crews know...



NO RADIATORS • NO BELT DRIVEN FANS

VAPOR PHASE with Steam Turbine Fan Condensers Solves ENGINE COOLING and LOAD CHANGE Problems!

At best, oil well drilling is rugged! When radiators boil and power fails, "there's hell to pay!"

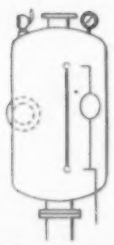
Engines that power drilling rigs are not to blame. It's the antiquated cooling system that steals power and fails to deliver under severe load and load-change demands.

For a year now, Vapor Phase has corrected these costly conditions for a major West Coast oil company. Instead of boiling radiators and frequent power failure, *trouble-free* Vapor Phase, with steam driven fans, now supplies constant uniform cooling under *all* conditions of load and ambient temperatures.

When drilling, driving mud pumps and pulling pipe to change bits, power to spare is assured. Load-change problems vanish. All engines remain at constant peak efficiency, whether idling, partially or fully loaded, or part of them overloaded.

With Vapor Phase, *waste heat* (not engine power) controls cooling, keeps it uniform. Precious make-up water, formerly wasted and blown over engines and floor, is now saved. Destructive engine condensation corrosion, sludging and hazardous working environment are eliminated—breakdowns and repairs, rare!

Vapor Phase functions automatically...



VAPOR PHASE also serves vital power needs in PIPELINE PUMPING STATIONS, GASOLINE PLANTS, REFINERIES, ENGINE GENERATING PLANTS, etc.

AND ALL IT COSTS IS FUEL FOR THE ENGINES!

Sizes available for any individual or group of Diesel, Gasoline or Gas engines.

VAPOR PHASE pays off in Savings alone, the first year. The unit costs nothing to operate and is good for life.

WRITE OR WIRE FOR INFORMATION

Offices in Most Principal Cities

ENGINEERING CONTROLS, Inc.
2835 East Eleventh St., Los Angeles 23

Inland River Reports

By DAVID I. DAY

THE NEW towboat *Lydia H* of the Tex-Mex Towing Co., Inc., Houston, Tex., is doing a fine job on the Intracoastal Canal in charge of Capt. Paul R. Beard. The boat was launched very recently at the Bludworth Shipyard. In dimensions, 70 x 23, the boat is powered by twin Caterpillar diesels, totaling 800 hp. We noticed the exceedingly nice galley with a new-model Webbperfection range.

THE THREE big Central Barge Company diesel vessels, the *A. M. Thompson*, the *Central*, and the *Northern* have gathered to break ice on the Illinois river for the U. S. Coast Guard. They are among the most powerful on the inland waterways, the two former powered by Enterprise diesels (twins) and the last-named by Fairbanks-Morse twins. The price for ice breaking is reported at $1050 a day each for the boats when busy, $650 daily each when on "stand-by duty."

ONE OF THE finest and smoothest running new diesel vessels on the inland rivers is the *Delta Cities* of the Lake Tankers Corporation fleet. It is 142 x 42.5 x 11.5 feet and the main engines are Fairbanks-Morse twins, totaling 3000 hp. The boat was built by St. Louis Ship and has 108-inch propellers made in Sweden.

THE *Cherokee* of the Indian Towing Company fleet made her first trips up the Ohio this fall. She has General Motors diesel engines. This boat was once a Navy mine sweeper and pushes a barge that was made from a war-time LST.

IN PASSING the mouth of the Muskingum River at Marietta, O., on the Ohio we were amazed at the sand and gravel activity and to see the dredging operations of the U. S. Engineers. Most interesting was the little motor vessel *Ruth* of the Kanawha Sand Co. This little 65-ft. pusher has been busy on the upper Ohio since 1927, using a 100 hp. Fairbanks-Morse diesel engine at the present. The old *Nemacolin* of the Engineers at work nearby came out back in 1929. She has a 120 hp. Washington diesel.

THE HISTORIC old ferry at Fly, O., is being pushed by the new *O'Tuely*, powered by a 200 hp. Cummins diesel engine. The last trip we made up the Ohio, the ferry flat was being handled by the *Kiwanis* with a new 110 hp. International diesel.

THE *Bruce Arthur* in the St. Louis-Chicago grain trade is another new towboat offering promise for the future. Power for the 86-ft. boat is provided by a General Motors (Cleveland) 765 hp. Owned by A. L. Mechling Barge Line, the boat was built at the Arnold V. Walker Shipyard, Pascagoula, Miss. This boat like all the Illinois River pushers has an elevator-type pilot house.

IN AN EFFORT to keep traffic going on the upper Mississippi as late as possible this fall, the diesel cutter *Fern* of the Coast Guard at St. Louis worked breaking ice on the upper reaches. The *Fern* is 114½ ft. long, 30 feet in beam, and 5½ feet deep, being powered with three Fairbanks-Morse engines totaling 960 hp. The ice breaker each year follows the last of the commercial towboats down the Father of Waters.

AS THIS is written, the finishing touches are being put on the *E. C. Marshall* of the Freeport Sulphur fleet at the Arnold V. Walker Shipyard, Pascagoula, Miss. This towboat is 70 x 20 x 7 and is powered by twin Caterpillars, each of 400 hp. The boat will run from the Bay St. Elaine sulphur mine to the Port Sulphur plant of the Freeport Sulphur Co., and will be one of Louisiana's most interesting towboat operations.

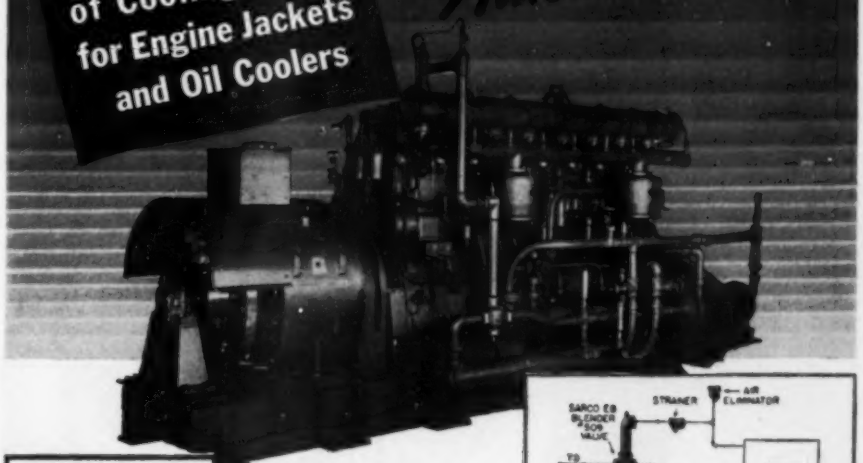
THE Koch-Ellis Marine Contractors, Inc., New Orleans, are vastly pleased with the performance of the *Fella C*, the little towboat built recently for the company by Avondale Marine Ways, Inc. The boat is 51 x 11 x 5, is powered by a 260 hp. Superior diesel engine, and is built especially for pushing barges in the Louisiana bayous, using her two backing rudders. The company thinks of ordering a duplicate built shortly.

PLANS ARE announced by the Ray C. Call Company, General Motors engine distributors, for a new building at Charleston, West Va., on the Kanawha River. At that moment, the Call men were delivering twin G-M engines to Capt. W. F. Potts, Sardis, Ohio, for the captain's new ferry towboat, the *Billy Potts, Jr.*

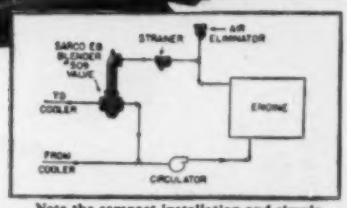
Constant Temperature...

of Cooling Water for Engine Jackets and Oil Coolers

Automatically



Atlas Imperial Diesel Engine, equipped with Sarco type EB blender to maintain constant jacket water temperature by re-circulating a varying portion of the cooling water.



Note the compact installation and simple piping. Also shown are the Sarco air vents and strainers which are necessary for efficient operation of the cooling system.

Sarco type EB Self-contained Water Blender, with built-in liquid-expansion thermostat for re-circulating control.

Sarco Blenders, by maintaining constant cooling water flow with controlled outlet temperature, insure rapid warm up, correct running temperatures and minimum temperature rise.

Simple, dependable Sarco controls prevent over-cooling or under-cooling, thus reducing wear on liners and rings, caused by cylinder condensation.

Smaller temperature fluctuations reduce stress and result in longer operating life and less maintenance.

Controlled Lube Oil temperature assures efficient lubrication.

Full information in Bulletin 702, sent free on request.

347

SARCO COMPANY, INC.

EMPIRE STATE BUILDING, NEW YORK 1, N. Y.

SARCO CANADA LTD., TORONTO 5, ONTARIO

REPRESENTED IN PRINCIPAL CITIES

Diesels Rescue Miners

Two bulldozer-equipped diesel tractors were among the heroes of one of the most dramatic rescue operations in years in Madera County, California, following a brutal mid-November snowstorm which trapped workers at the Strawberry tungsten mine, located at a 7,800-foot elevation. Seventeen persons were brought out safely after being trapped for 11 days. Also brought out was the body of a miner who had died during the storm. Rescue operations were started from both ends of a 20-mile stretch of snowbound road only at the conclusion of the five-day storm. The tractors, equipped with snow tracks and a snow weasel, worked from the mine end of the road with one of them pushing up the mountains from the lower end. Those rescued came out in bulldozer and snow weasel-towed trucks, one of which bore the body of the dead miner. The diesels were a Caterpillar D8 and D6.

Pennsylvania RR Buys More Diesels

A $60,000,000 order for new diesel electric locomotives and freight cars, plus additional appropriations of approximately $12,000,000 for new rails and rehabilitation of existing freight cars through heavy repairs, was announced by Walter S. Franklin, president, Pennsylvania Railroad. "This announcement," Mr. Franklin said, "brings the Pennsylvania's new and rehabilitated equipment program for the last few years to over $650,000,000, and emphasizes the tremendous capital needs of the railroads in these times of inflation. Depreciation funds available cover less than half the cost of replacing worn out equipment with new and modern equipment." Included in the $60,000,000 authorization are 180 diesel electric locomotives and 5,000 modern freight cars. With deliveries during this year and early in 1953, this equipment will add significant reinforcement to the 1,168 diesel locomotives and 26,860 new freight cars already purchased by the Pennsylvania as a part of its post-war and preparedness program. The $266,000,000 program announced in 1949, then the largest undertaking in the road's history, has grown, under the impetus of Korea and national mobilization, to almost two and a half times its original size.

Another **UNION DIESEL** *Installation*

The **UNION DIESEL ENGINE** *Co.*
2121 DIESEL ST., OAKLAND 6, CALIFORNIA, U.S.A.

Tool Removes Cylinder Liner Ridges

A portable ridge grinder that grinds true to the worn contour of cylinder liners has been developed by B. K. Sweeney Manufacturing Company, of Denver, Colorado, manufacturers of Sweeney Powerench and other special tools for diesel engine maintenance. The new tool removes ridges from either chrome plated or cast iron liners in less than three minutes, and is adjustable to fit any size liner from 7⅞-inches to 16-inches inside diameter. On special order, units can be furnished to fit any size liner up to 25-inches id. It is said that this new ridge grinder feathers-out the ridge so smoothly that pistons and rings can be readily withdrawn through the top of the cylinders. A built-in wheel dresser provides for wheel dressing without removing the grinder from the cylinder liner. Easily portable, the total weight of the entire unit is 32 pounds. Detailed literature available on request. Write B. K. Sweeney Manufacturing Company, Denver, Colorado.

DIESEL ENGINE CATALOG is now available in its Sixteenth expanded edition. Completely revised and re-edited, it is an invaluable aid to design engineers and buyers. Fully illustrated. $10.00. Order now from DIESEL PROGRESS, P.O. Box 8458, Cole Station, Los Angeles 46, California.

Completes 50th Year

Harry Pastre, right, retired Elliott vice president presents oil portrait of the company founder, W. S. Elliott, to company president W. A. Elliott.

Elliott Company, Jeannette, Pennsylvania, manufacturer of steam and electrical equipment, recently marked its 50th year at a special meeting of the Elliott Veterans Association. Nearly 300 veterans, ranging from 20 to 50 years of service, took part in the affair. A series of episodes from the company's early history was dramatized, including several amusing incidents from the career of the late founder, W. S. Elliott.

An interesting scene was a presentation of the first Elliott board of directors meeting on October 28, 1901, with Elliott veterans, in the costume of the times, reproducing the event from actual minutes of the original meeting. Company president W. A. Elliott, son of the founder, carved a giant birthday cake commemorating the anniversary. Highlight of the evening was a surprise unveiling of a life-sized oil painting of the founder. Making the presentation on behalf of Elliott Veterans was Harry Pastre, retired vice president and long time associate of the founder. President W. A. Elliott accepted the portrait.

Attend Texas-Illinois Pipeline Ceremony

A "valve turning" ceremony at Joliet, Illinois recently, when the first natural gas was sent from Southeastern Texas to Chicago, was attended by executives of Worthington Pump and Machinery Corporation. This is the second pipeline to Joliet from Texas, since the first line from the Texas Panhandle to Joliet has been operating since 1931. Both pipelines feed into existing lines running from Joliet to Chicago. Worthington executives attending were: Mr. C. E. Searle, vice-chairman of the board; Mr. E. J. Schwanhausser, executive vice-president; A. C. Ross, vice president; W. O. Wilson, commercial vice president; A. W. Fraser, Midwestern district manager; W. C. Cheek, Chicago district manager; A. Traber, sales engineer and H. C. Lehn, consulting engineer.

Twenty-five Uniflow Angle gas engine compressors have been supplied by Worthington Pump and Machinery Corporation to the Texas-Illinois Natural Gas Pipeline Company for this new line from Southeastern Texas to Joliet, Illinois. In these engines, the through-scavenging system was adapted to pipeline gas engines for the first time. This system has long been in use in diesel engines and its adaptability to gas engines is the result of seven years' research by Worthington. These engines thus represent an advance in pipeline compressing equipment. Of the original gas pipeline to Chicago, built by Natural Gas Pipeline Company of America in 1931 from the Texas Panhandle field to Joliet, Illinois, Worthington furnished fifty-seven 1400 horsepower gas engine compressors—the total on the pipeline. When the completion of a duplicate parallel line was started in 1946 thirty-seven gas engine compressors of this same type, size and horsepower were furnished and a total of 104 of these twin tandem horizontal Worthington units are now operating on these two lines. This recent purchase through an affiliated company makes the third time Worthington has supplied the major requirements for these associated lines. These twenty-five angle type gas engine compressors of 2000 hp. and 10 cylinders each will be the total number of the initial installation on the pipeline of the Texas-Illinois Natural Gas Pipeline Company, an affiliate of Natural Gas Pipeline Company of America.

New Plant for Fairbanks, Morse

Fairbanks, Morse & Co. has awarded a contract to the S. Patti Construction Co. of Kansas City, Missouri, for the yard work for its new pump plant in Kansas City, Kansas. The contract is on a cost plus basis and will be for the sewers, roads and other ground detail. Contracts, as yet, have not been let for the actual construction of the plant which is scheduled to begin next spring. The new plant will have a machine shop containing 190,000 square feet of floor space, a foundry with 150,000 square feet, and an office building with 20,000 square feet.

Eaton Parts for Diesel Engines

have a background of years of cooperation with the Diesel industry

Eaton is proud to have served as supplier to leading Diesel engine manufacturers for many years—furnishing valves, free-valves, lash adjusters, valve seat inserts, cam followers, bolts, studs, and other precision parts. This close cooperation with the Diesel industry has given Eaton engineers a thorough understanding of the requirements of specific engines, so essential in solving valve-train and other problems.

You can utilize Eaton's long experience in this field by giving our engineers an opportunity to work with yours in the early stages of design.

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Promoted to Regional Manager

Ray F. Davis

R. F. Davis, former assistant regional manager, Cummins central region, with headquarters at Chicago, has been promoted to regional manager, Cummins eastern region, with offices in the Chrysler Building, New York City. His new position was announced by L. W. Beck, vice president—sales, Cummins Engine Company, Inc., at Columbus, Indiana. Mr. Davis has been employed by Cummins since the spring of 1942. He first served as an inspector in the Cummins production line, and in 1944, was transferred to the purchasing department where he became a field expediter. In September, 1947, he became manager-engine sales and held this post until November, 1948 when he joined the regional organization. Walter N. Westland, former regional manager of the eastern region now heads Cummins Diesel of New England, Inc., with headquarters at Allston, Massachusetts.

Deceased

Edward C. Gillette died November 9th, 1951. Mr. Gillette had been retired for the last 8 years after serving 23 years as chief of the Marine Engineering and Construction Division of the U. S. Lighthouse Bureau. When he retired he had completed 37 years in the government service. Mr. Gillette supervised the construction of 12 lighthouse tenders and one lightship prior to becoming superintendent in the second district with headquarters at Boston, Mass. In March of 1914, he was appointed superintendent of Naval construction of lighthouse and lightship. Some 20 lightships and 40 lighthouse tenders had been designed and constructed during Mr. Gillette's incumbency. These covered a wide field of progressive development including steam, diesel, and diesel-electric propulsion, and designs to meet the unique service requirements for seagoing vessels and vessels for use on the various river system and other interior waterways. Mr. Gillette is survived by his son, F. W. Gillette, who is southeastern representative for The Buda Company, handling extensive work in the marine engine installations and engineering.

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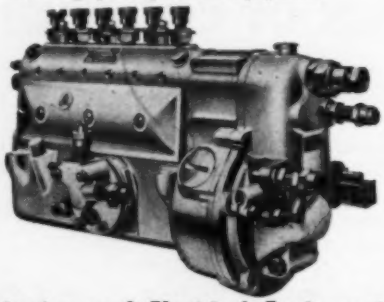

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Big Dollar's Worth

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Engineering Bulletin

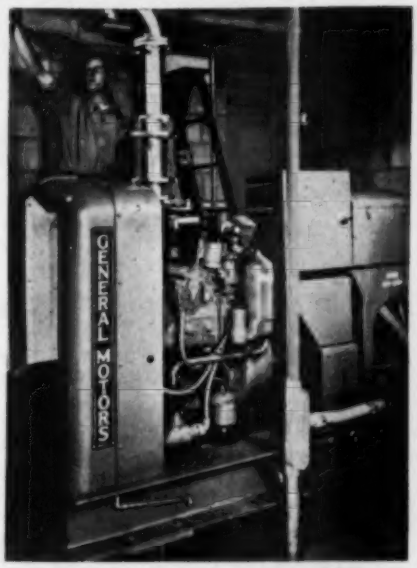
The Cooper-Bessemer Corporation, Mount Vernon, Ohio, has issued a new bulletin which gives complete engineering data covering Cooper-Bessemer's Type-M line of motor driven compressors. The compressors described range from 250 to 1000 horsepower with standard two-stage units and 300 to 1000 horsepower with standard single-stage units. Bulletin is available on request to the company. Ask for Bulletin M-65.

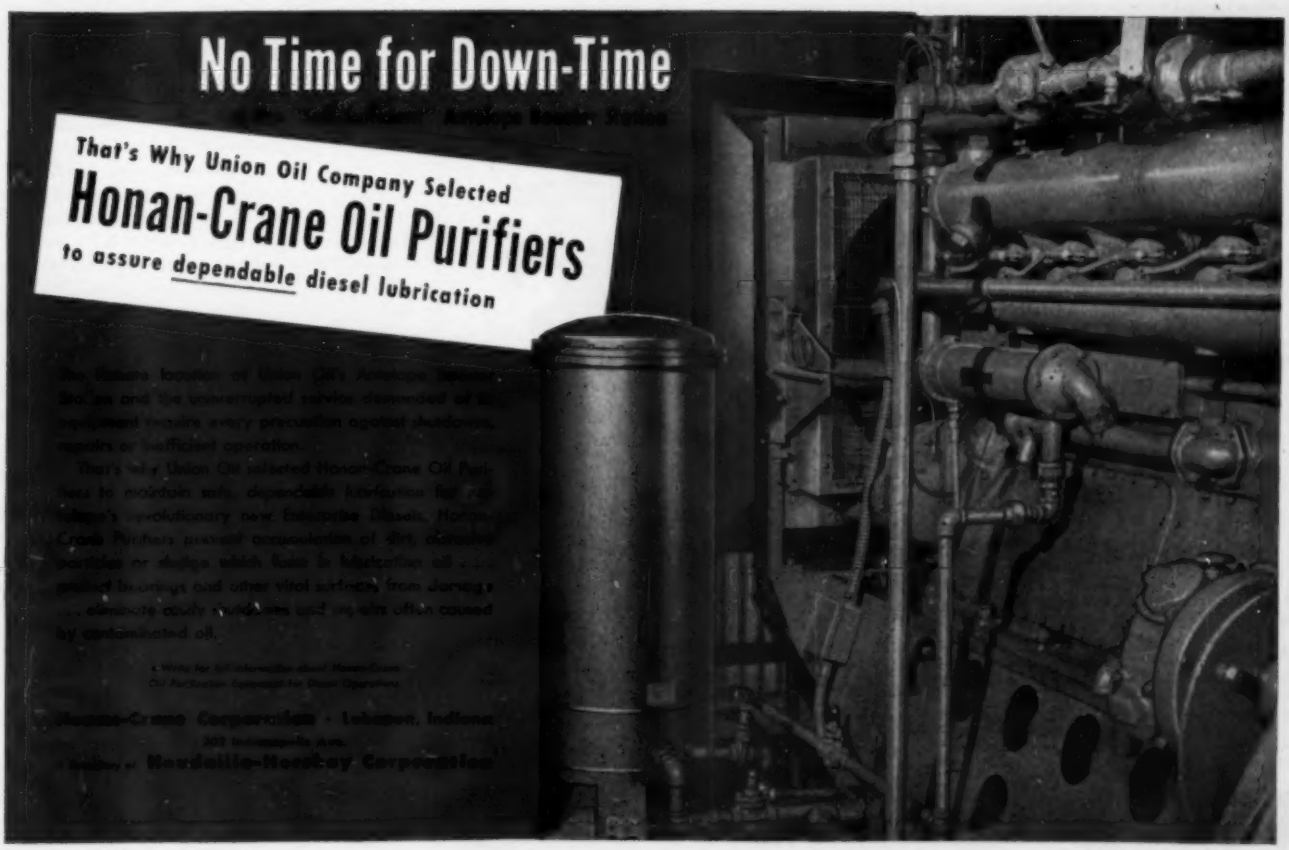
TRANSCONTINENTAL TV TRANSMISSION

Now that coast-to-coast television is a reality the story of some of the elaborate means provided to guard against failure in transmission can be told. With the necessity for crossing alternate stretches of high mountain land and desert a most rugged set of conditions prevail. To meet these conditions some of the finest electronic equipment ever developed is employed.

Coaxial cable, designed originally for telephone use, was found to be adaptable to television transmission with minor modifications. Consequently, it was used extensively for establishing the early television networks in the east. Microwave radio-relay, a more recent advance in the science of communications, is used, where justified, for both television and telephone transmission. The recently completed transcontinental radio-relay system is an important addition to the growing intercity television network. This relay system has been set up under the direction of the Long Lines Department of the American Telephone and Telegraph Company. In addition to making every provision known for reliability in the basic installation, including emergency storage batteries, a complete standby system backs up the normal ac power supply for the relay stations. This standby equipment consists of diesel engine-driven generators which can supply ac power in a matter of seconds should the high-line power ever fail or should high-line voltage fall even 10 per cent below normal.

Illustrated here is a typical relay station standby equipment. This particular equipment is on Buckhorn Mountain located about 63 miles northwest of Denver, Colorado. The particular engine shown is a two-cylinder GM diesel engine made by the Detroit Diesel Engine Division of General Motors Corporation. While an attendant is shown in the illustration the unit starts and continues to operate whether it is attended or not. This diesel engine is so designed that it will start at temperatures as low as 20 degrees Fahrenheit on the first cranking attempt. It will operate up to 15,000 feet elevation. To insure starting in subzero temperatures a jacket water heater is supplied which with thermo-siphon circulation keeps the water temperature at a nominal 90 degrees Fahrenheit. It is interesting to note taht the starting motor operates from a 32-volt battery as compared with normal 6 or 12 volts on cars and trucks. This further insures certain starts. Every technical safeguard surrounds this installation and the standby system to maintain exact radio frequencies and all other factors of transmission to provide the highest possible standard of accurate picture and sound transmission.

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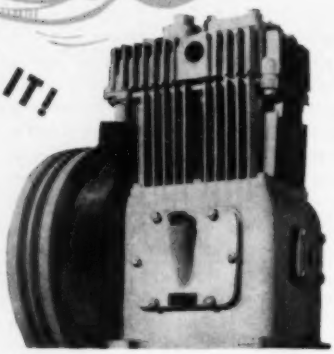

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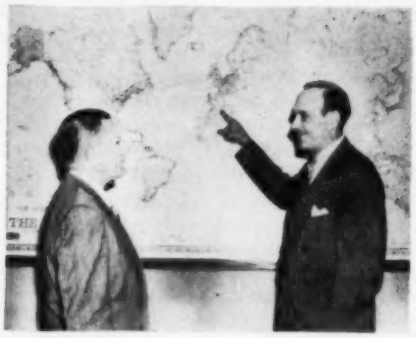


L. W. Beck (right), vice president-sales, Cummins Engine Company, Inc. at Columbus, Indiana, and G. W. Glenn, vice president and general manager, Cummins Diesel Export Corporation (a wholly owned owned subsidiary), are shown reviewing their recent five week air tour of Europe.

Two Cummins executives returned recently from a five-weeks trip to Europe where they talked with Cummins dealers and others in the heavy-duty machinery business about the prospects of diesel engine and dieselized equipment sales as well as the general market potentials in the industries where Cummins diesels are used. Traveling by air between all major points, L. W. Beck, who is vice president-sales of Cummins Engine Company, Inc., at Columbus, Indiana, and in charge of all domestic and export sales activities, and G. W. Glenn, vice president and general manager, Cummins Diesel Export Corporation (a wholly owned subsidiary), stopped in 12 countries and visited with business contacts in nine of these countries on their 14,000 mile trip. Mr. Beck and Mr. Glenn stopped in England, Scotland, Sweden, Belgium, Germany, France, Switzerland, Portugal and Spain. In several of these countries, they surveyed diesel engine and other manufacturing facilities and talked with various industrialists about future market trends and manufacturing and distribution problems. Their discussions with numerous business and government representatives in nine different European countries emphasized the demand that exists for high output, high-speed, lightweight diesel engines in the 100-600 horsepower field, especially for heavy earth moving equipment, shovels, cranes and similar machinery.

Although the dollar shortage apparently is delaying in many instances the importation of more American-made heavy-duty machinery, complicated licensing procedures in all European countries appear also as an important contributing handicap to a much needed two-way commerce. Four engine plants in Great Britain were visited by Mr. Beck and Mr. Glenn and included Rolls-Royce, Ltd., at Derby; Henry Meadows, Ltd., Fallings Parts, Wolverhampton, Staffordshire; Mirrlees, Bickerton & Day, Ltd., Hazel Grove, Cheshire; and Leyland Motors, Ltd., Lancashire. They also went through the European plant near Glasgow, Scotland, of The Euclid Road Machinery Company, Cleveland, Ohio. In Sweden, the men made a tour of the Scania-Vabis plant at Sodertalje, near Stockholm, where trucks and diesel engines of Swedish-make are manufactured. They also toured the Saurer S.A. works at Arbon near Zurich in Switzerland, where trucks and engines also are made.

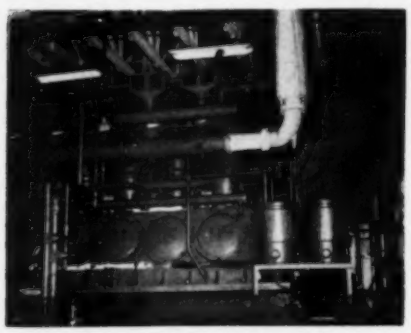
Hawaiian Diesel Applications

Narrow gauge diesel locomotive working the plantations of the Lihue Plantation Company, Ltd. Note the Winslow Model 8-951-D oil conditioners.

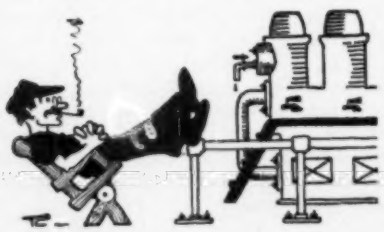
Because of their greater efficiency, diesels are more and more becoming the basic power source in the Hawaiian Islands. Plantations have become practically completely dieselized in all their phases of operations. Shown above is one of the numerous narrow gauge locomotives doing service in the cane and pineapple fields. Both the locomotive and the truck illustrated feature Winslow full-flow oil conditioners.

One of the Cummins powered trucks with Winslow filters for work in the fields.

The 525 hp. Atlas diesel shown features two Winslow jacketed full-flow filters. The engine generates power for the Molokai Electric Company, Ltd. on the island of Molokai.



The Molokai Electric Company's Union diesel equipped with two Winslow jacketed filters.



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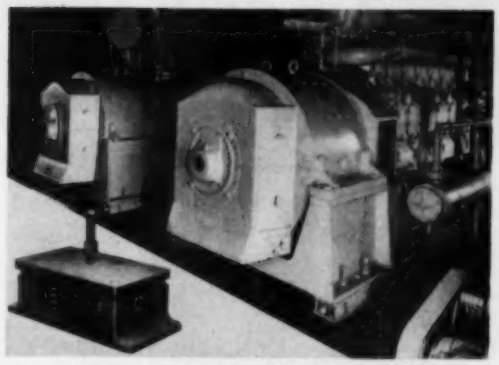

A pair of Nordberg four-cycle, six cylinder, 9" x 11½", supercharged diesel engine generating units, installed, for smooth operation, on Korfund Steel Spring Vibro-Isolators.

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New Yorker Hotel, New York ..... 1 530-hp.; 1 750-hp. Bosch-Sulzer
Namm Department Store, Brooklyn
4 300-hp.; 1 180-hp.; 1 150-hp. Worthington
Macy's, New York ..... 1 700-hp. Alco
Floyd Bennett Field, New York ..... 1 450-hp. Fairbanks-Morse
Prudential Insurance Co., Newark, N. J. ..... 1 740-hp. Baldwin
Lone Star Gas Co., Dallas, Texas ..... 1 400-hp. Cooper-Bessemer (Gas)
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Industry and School Research

In a paper delivered before the recent Chicago meeting of the Diesel Engine Manufacturers Association, Mr. F. M. Young, president of Young Radiator Company of Racine, Wisconsin, outlined certain problems facing the heat exchanger and heat transfer products industry on which schools may do helpful and practical research. He pointed out that the correlation and reporting of data is a function that a university is well suited for. Individual effort by professors does not permit a thorough-going inspection and analysis of existing data. He stated that the proper examination of many sets of data require the directed efforts of a team. Mr. Young pointed out that heat transfer data is gravely lacking for hydrocarbon vapors, mixtures of hydrocarbon vapors, vapors and steam. Another worthy project would be the investigation of variation in heat rejection to lube oil and jacket coolant on several of the same make and model of engine. His paper touched on the corrosion of heat exchangers and the need for metallurgical methods of attaching aluminum fins to copper or copper alloy tubes.

Navy Release re Amyl Nitrate

Tests are under way by the Navy on a new chemical compound designed to raise the quality of diesel fuel for Navy requirements without the extra refinery operations now necessary, according to Rear Adm. H. N. Wallin, chief of the Navy's Bureau of Ships. If successful, said the Navy, the compound will greatly increase the amount of fuel oil available for submarines and other diesel vessels without added strain on the nation's oil refineries. The compound is the result of four years of research by the Ethyl Corporation and is a blend of several amyl nitrates found to be the most economical and practical as a quality booster of diesel fuel. Small amounts of the compound added to diesel fuel will improve its quality, according to the Navy, thus causing it to ignite more readily in the combustion chamber of an engine.

Diesel fuel quality is now raised to Navy specifications by refining, which reduces the amount of usable fuel that can be obtained from a given quantity of crude oil. With the use of the new blend, much of this refining might be eliminated, which would permit refiners to meet enlarged wartime demands. It would also permit them to devote more of their facilities to production of other critically-needed fuels, the Navy stated. Even without increased defense needs, the compound is expected to aid the job of oil refiners in meeting the normal rise in demand for diesel fuel. The demand has jumped four-fold in the last ten years. Also foreseen is the possibility that diesel manufacturers will be able to design engines to operate on a uniform grade of fuel oil from coast to coast, instead of on the broad range of fuels now being produced, and thus insure better engine performance.

This may be possible because the new compound, when added in different amounts to fuels of different grades, could raise them all to a uniform level. No plans for making the amyl nitrate blend commercially available have been announced by Ethyl Corporation. Such plans are not expected until after the tests are concluded.

Fairbanks-Morse Vice President

J. F. Weiffenbach

Robert H. Morse, Jr., president and general manager of the Canadian Locomotive Co., Ltd., Kingston, Ontario, has announced the appointment of J. F. Wieffenbach as vice president in charge of manufacturing. He succeeds J. J. Jarrell, who has retired following 45 years with the Canadian firm. Mr. Weiffenbach brings to his new position wide experience in the engineering and manufacturing of diesel products. He was graduated from the University of Michigan in 1934, having majored in mechanical engineering. For 12 years he was associated with the Electro-Motive Division of General Motors at La Grange, Illinois, serving as locomotive engineer. Five years ago, he joined Fairbanks, Morse & Company in Chicago. He was subsequently appointed chief engineer of the company's diesel locomotive division and later manager of engineering at the plant in Beloit, Wisconsin. He became works manager of the Canadian Locomotive Company at Kingston in April, 1951. In addition to the manufacture of diesel-electric locomotives, he will also direct the manufacture of a wide range of industrial equipment made by the company.

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Driver of The Year

L. W. Beck, vice president-sales, Cummins Engine Company, presents the 4-foot trophy to John H. Castner.

Two more honors for the trucking industry's 1951 "Driver of the Year": 1. First three-time winner of the truck-and-trailer National Roadeo championship. 2. Permanent possession of the Cummins Trophy awarded each year to the winner in this classification. John H. Castner, senior driver for Pierce Freight Lines, Portland, Oregon, won the right keep the huge Cummins Victory Cup by placing first for the third consecutive year in the National Roadeo truck-and-full-trailer finals held recently in Chicago during the American Trucking Association's convention. Cummins Engine Company, Inc., Columbus, Indiana, has made the award annually since 1940 to inspire greater skill and safety in the operation of heavy-duty trucks. Castner first won the trophy in 1949 at Phoenix, Arizona. He retained the cup by again winning the 'big truck" classification championship at the 1950 Roadeo in New York City. Castner received miniature replicas of the trophy after each championship, and now will retain the big four-foot victory cup too. L. W. Beck, Vice President-Sales, for Cummins, has announced that a new Cummins trophy would be ready in time for presentation at the 1952 ATA National Truck Roadeo finals.

Nordberg Distributorship

The appointment of Eighmy Equipment Company, Pierpont at West State Street, Rockford, Illinois, as distributor for Nordberg 4FS diesel engines in the northwestern and central section of Illinois has been announced by Nordberg Manufacturing Company, Milwaukee, Wisconsin. Eighmy Equipment Company was established in 1940 with Mr. B. O. Eighmy, former sales manager Link-Belt Speeder Corporation, as president. The company maintains a well tooled machine shop staffed with competent, trained servicemen under the direction of Harry Spieser, service manager, and has a parts department managed by Marvin Stieger. The sales and service facilities of the company are housed in a building occupying some 8,000 square feet of floor space. In addition, the organization has three acres of demonstration ground and storage facilities west of Rockford.

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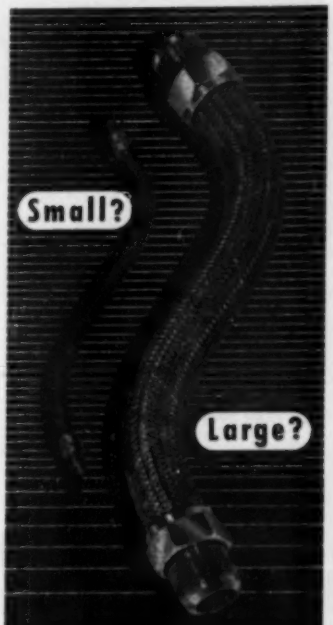

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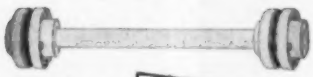

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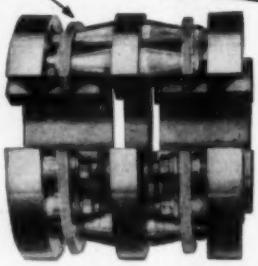

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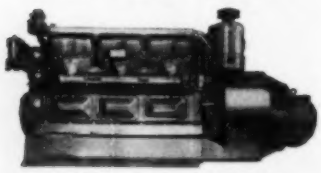

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Maintenance

. . . continued on page 73 . . .

for any period of time at lower current densities, either some brushes should be removed or a different grade inserted.

In areas where there is a decided seasonal change in humidity, a change to a more lubricating type of brush during periods of low humidity may be desirable. Presence of certain chemical vapors, especially sulfur or ammonia and even vapors given off by silicone insulation, may have marked effects on the formation of the proper film, and may dictate the proper choice of brushes. Presence of these vapors will frequently result in a high resistance film which may cause loss of excitation. In such conditions, the use of some abrasive brushes is indicated. The presence of liquids, such as water, oil or grease, on the commutator surface will ruin attempts to get good commutation.

It is a "must" that the commutator be concentric, the bars be tight, and the mica be undercut. V-rings should be checked for tightness, particularly the first couple of weeks after starting and then during annual inspection. The matter of securing good commutation is much too involved to cover here except for the high spots. It is often a matter of cut and try. If trouble is experienced consistently due to sparking, or if brushes fail to last at least three months, check with the machine manufacturer or secure recommendations from a brush manufacturer.

Writer's Comment: The foregoing statements on commutation merely substantiates the theories taken up in the first section of this series on electrical maintenance, yet the importance of good commutation and the maintenance involved cannot be stressed too strongly.

SHAFT CURRENTS: Under certain conditions, alternating voltages which tend to cause currents to flow will be induced in rotating electrical machines. Possibility of harmful currents in exciters or induction motors of the ratings discussed here need not be considered. However, many combinations, of numbers of rotor poles and of stator lamination joints will induce such voltages in alternating current generators. The frequency will be line frequency or higher, depending upon the physical combinations involved. The current resulting from such an induced voltage will flow through the shaft, the oil films in the bearings, the pedestals, and the base. If of sufficient magnitude, erosion of the bearing will result and the bearing will fail. If the generator is mounted on the engine shaft, the engine bearings will also carry the current and may, under some conditions, suffer more damage than the generator bearings. To prevent shaft currents, it is only necessary to insulate the outboard pedestal from the base. This can be done by means of a 1/16 to ⅛ inch bakelite spacer between the pedestal feet and the soleplate, 1/16 inch bakelite bushings around hold down bolts and dowel pins, and 1/16 inch bakelite washers under the bolt heads. Care must be taken that no oil lines or other metal parts short circuit any of this insulation.

In some cases, there appears to be evidence of shaft current flow even though there definitely is effective insulation in its path. The evidence is eroding of bearing liners into a mottled pattern in the bearing surface and possibly some small pits in the journal. Since there was no possibility, in these cases, of shaft currents, it appears that the effect must be a local one within the bearing shell itself. If so, it can be caused only by shaft magnetization. This might result from the nature of the magnetic structure of the machine, or it might be residual magnetism. In one case, it was necessary to introduce an air-gap by means of a pedestal shim of ¾ inches in the magnetic circuit to eliminate bearing damage.

On self-contained machines, bracket-type or two-pedestal type with base, the electrical manufacturer will insulate one bearing on units where shaft currents might be expected. Engine type generators have no bearings, but the outboard pedestal may serve as a return path. In cases where trouble might be expected, the engine manufacturer is requested to insulate the outboard pedestal. In cases where bearing failure due to shaft currents or magnetic action is suspected, consult the machine manufacturer for possible remedy. In all cases the bearing opposite the drive end is the one which must be insulated.

Writer's Comment: This matter of shaft currents and magnetic action is a vital one and in many instances becomes rather a puzzling problem. However, good insulation, properly placed on the pedestals, around the bolts and under the bolt heads, will eliminate the difficulty. One thing must be religiously observed even then and that is to keep this insulation free from oil, dirt and dust, for often in the best insulated parts, an accumulation of oil, moisture or dirt will reduce the effectiveness of this insulation. It is well to give such insulation a coat of shellac occasionally.

FIELD COIL CHECK: Telephone Influence Factor, commonly abbreviated to TIF, is a measure of the susceptibility of a machine toward producing harmonics which cause interference with telephone conversations. It might be assumed that after a machine has been installed no change should occur which would cause a change in its TIF. However, any condition which upsets the symmetry of the magnetic circuit could contribute to an increase in TIF. In one case a machine which had been operating with only nominal interference was found to have greatly increased influence on telephone noise. On inspection, it was found that a few of the field coils were partially short-circuited. When this condition was remedied, the telephone interference was removed. A simple check of field coils is to apply about 25% of normal d-c voltage to the collector rings. Connect flexible leads from a low reading voltmeter to two ice picks with insulated handles. These points will readily penetrate the insulation at the connections between field coils, and the voltage drop per coil can be determined. A difference of plus or minus 4% from the average should lead to the conclusion that some short-circuited turns are present. If any pole approaches a 4% deviation from the average, an a-c check is desirable. In making the a-c check, remove the rotor from the stator and locate it so that no external magnetic material can influence the magnetic field. Apply 110 volts a-c to each field coil in turn, measuring the current input. The presence

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of even one short circuiting turn will be evidenced by a high a-c current input, as compared to the average. The short-circuited turn serves as a short-circuited secondary of a transformer and causes a high current to be drawn by that coil.

CONCLUSION: The electrical equipment properly applied and properly maintained, will provide many years of trouble-free service. Obsolescence, rather than wear, is a common reason for replacement or retirement of electrical apparatus. Bearing failure, usually due to improper lubrication, is probably the most common source of motor trouble. Some types of bearings need attention only at 5 year intervals. This sometimes leads to similar infrequent attention to other bearings and to subsequent breakdown. On the other hand over-greasing is probably worse than under-greasing. Stator coil failure is probably the next most common type of motor trouble. Overloading and improper ventilation, together with accumulation of oil, dirt, and moisture, all contribute to coil breakdown. Too frequent starting or too prolonged starting periods should be guarded against.

This all emphasizes the necessity for close checkups to see that proper attention is given these machines. Keep the machines clean, cool, dry and properly lubricated; avoid excessive vibration, and thus obtain the service life which the manufacturer originally built into the equipment. Obviously, only actual operating experience can determine what portions of the above recommended maintenance practices are usable and which must be modified to fit specific plant conditions. However, the above may serve as a basis from which a practical start may be made.

Writer's Comment: In the foregoing articles Mr. Oscarson has very ably discussed this matter of preventive maintenance in electrical equipment. Of course the various recommendations could be enlarged upon, providing time and space permitted. But for all practical purposes he has laid the ground work from which to start, and the spice of the whole series is contained in the last paragraph wherein he states that only actual operating experience can determine what portions of the above recommended maintenance practices are usable and which must be modified to fit specific plant conditions.

I might add further that there is a recent publication, gotten out by the National Electrical Manufacturers Association, 155 East 44th Street, New York 17, N.Y., which should be in the files of every Power Plant Maintenance Superintendent. This publication is called "Protective Maintenance of Motors and Generators" with an Appendix containing NEMA standards for renewal parts, proposed definitions and record forms. It may be had for the asking.

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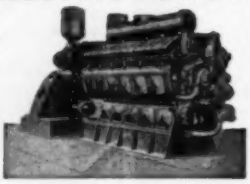

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Appointed President and General Manager

Rog C. Ingersoll, president of Borg-Warner, has announced the appointment of A. J. McAllister as president and general manager of the Detroit Gear Division of the corporation. Mr. McAllister until recently was president and general manager of the Fairchild Manufacturing Company at Lafayette, Indiana. Mr. McAllister succeeds Howard E. Blood, of Detroit, who has been president of Detroit Gear since 1923, when it was a separate company, as well as since 1929, when it was merged with Borg-Warner. Mr. Blood will continue as a vice president and director of the parent corporation, Borg-Warner. He will also assume charge of the new Products Development Laboratory which Borg-Warner is establishing in Detroit for the purpose of developing new and improved types of automatic transmissions and other products. A mechanical engineering graduate of Purdue University, he successively was sales engineer, sales manager, then secretary of Fairfield Manufacturing Company, and was elected president in 1931. It was also announced that D. T. Sicklesteel, previous Detroit Gear's vice president in charge of engineering, has been appointed general manager of Borg-Warner's new Products Development Laboratory.

Elected Director

Charles J. Surdy, vice president, Read Standard Corporation, in charge of Standardaire Blower Division sales and engineering, has been elected a director. Mr. Sturdy has been with the company since 1926.

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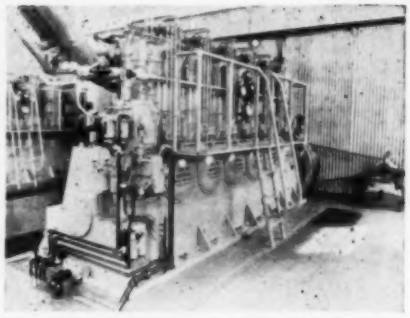

After eleven years in oil-pumping service, these two 400 hp., 6-cylinder, 327 rpm., Atlas diesels still give excellent performance. In the 25 months since last overhaul, their service availability has been 99.99 and 100%.

Advantages of moving oil through a pipeline depend to a considerable extent on whether the cost of pumping power can be kept within reason. This is especially true where pipelines connect far-flung places. For instance, one company operates 1,400 miles of trunk and gathering lines to serve a great part of Texas. One section is handled by diesel engine driven pumps taking oil at 10 psi. and raising it to 900 psi. for discharge into the line. The diesels are 6-cylinder, 327 rpm., 400 hp. Atlas units connected to the pumps through gear drive. Although being consistently overloaded during the war years, and operating on a 12,000 hour overhaul schedule, the engines ran up an enviable record of performance.

After 70,000 hours of operation, more than 80% of the original main bearings and 60% of the original connecting-rod bearings were still in use, and average cylinder wear was about 0.022 inches. Records of one station show that in a 25 month period, one engine was available for service 100% of the time while the other, down for servicing 40 minutes, had an availability of 99.99%. In one year the two engines pumped almost 10 million barrels of oil. During this period, they consumed 192,832 gallons of fuel oil and 833 gallons of lubricating oil. At 6 cents a gallon for fuel oil and 70 cents per gallon for lube oil, the cost of fuel and lube oil was only 1.2 mills per barrel of crude pumped into the pipeline.

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West Coast Diesel News

By FRED M. BURT

TO SUPPLY welding current for field construction jobs by the Pittsburgh-Des Moines Steel Co., San Jose, Calif., two 60-kw., 440-volt, General Motors diesel generator sets, for substantial savings by eliminating installation charges for regular electric power; each unit will handle eight 300 amp. welders through plug-in socket connections.

RECENTLY COMPLETED, installation of a 3-71 General Motors diesel in a No. 2 Northwest Dragline operated by the U. S. Reclamation District No. 501, at Ryer Island, Sacramento River, Calif.

A CONTRACT awarded to Union Diesel Engine Co. by the U. S. Navy calls for two 800-kw. diesel-electric generating sets using General Electric generators, for use in Hawaii on radio transmitter sets; for same use at Monogram, Va., three 600-kw., Model P8 supercharged Union diesels with Westinghouse generators.

FOR JACKSON TOWING CO., Angleton, Texas, a 600-hp. supercharged Union diesel to power a towboat to be operated on the Inner-Coastal Canal and Gulf of Mexico; Lt. John Jackson of Angleton stationed with the Navy on San Francisco Bay, to work for Jackson Towing Co. after tour of duty, observed construction and tests of engine.

INSTALLED BY Consolidated Western Steel Corp., Los Angeles in a 220-cfm. Sullivan air compressor, a 53-hp. Caterpillar diesel.

FOR G. C. BRADY, Torrance, Calif. to power pump for irrigation on a cotton ranching operation near Las Vegas, an 80-hp. Caterpillar diesel from Shepherd Tractor & Equipment Co.

FOR EMERGENCY power in the new boiler plant, Univ. of Calif. at Los Angeles, a 60-kw. diesel-electric generating set, powered with an 80-hp. Caterpillar diesel with a Synchro-Start automatic start-stop unit.

FOR RE-POWERING a Model 6, Northwest shovel, a 135-hp. Murphy diesel from Engine Sales and Service, for Peter Kiewit Sons Co., in use on Santa Ana Freeway.

FROM West Coast Engine & Equip Co., Berkeley, Calif., for Wolf Creek Timber Co., a second General Motors twin diesel, 175-kw., generator set, to complete full electrification of mill; power for cutting 75,000 feet per day and all lighting including employee housing.

RECENTLY launched by A. C. Benson Shipyards, Vancouver, B.C. for Luigi Benedet to fish for Anglo-B.C. Packing Co., 83-ft. seiner-packer, *Belina*, powered with a 340-hp. Enterprise diesel.

CONSTRUCTED BY Tacoma Boat Bldg Co., designed by Arthur De Fever, marine architect of San Diego, the 144-ft. wooden tuna clipper, *Comet*, with 1600-hp. Fairbanks-Morse OP main diesel engine, driving through 3:1 Western Gear Co. reduction gear; auxiliaries are three 110 series, 100-kw. GM diesels; Joe Madruga and associates, San Diego, are owners.

LOCATED IN Pacific Electric Co. Bldg., Los Angeles, is the new sub-office of Baldwin-Lima-Hamilton Corp., in charge of H. A. Nielsen, assistant to district manager in San Francisco. Mr. Nielsen has been primarily concerned with diesel electric locomotive sales and service, testing machine service and calibration, and diesel renewal parts, in his association with the company.

FOR J. C. FREESE CO., San Francisco for installation in tug S.F. No. 1, a matched pair of 275-hp. General Motors diesels with GM 3:1 hydraulic reverse gears.

POWERED with a 260-hp. Washington diesel, 80-ft. seiner-packer, designed by Robt. Allan, Vancouver architect, for Joe Gregory and Nick Bordevich.

PRESIDENT Walter Harnischfeger of Harnischfeger Corp., Milwaukee entertained a notable group of contractors at the Biltmore Hotel, Los Angeles on Nov. 23, to discuss future development of P & H diesels in various applications; also reporting a new P & H diesel soon to be ready for use in trucks, tractors, and in industrial, oil field and marine usages. He expresesd great confidence in the future of diesels, both domestic and foreign markets; evidenced by completion of large, modern, P & H diesel factory at Crystal Lake, Ill.

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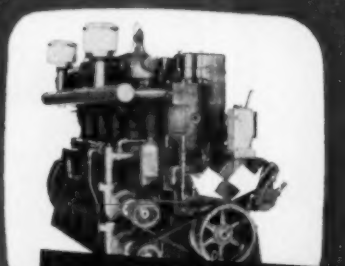

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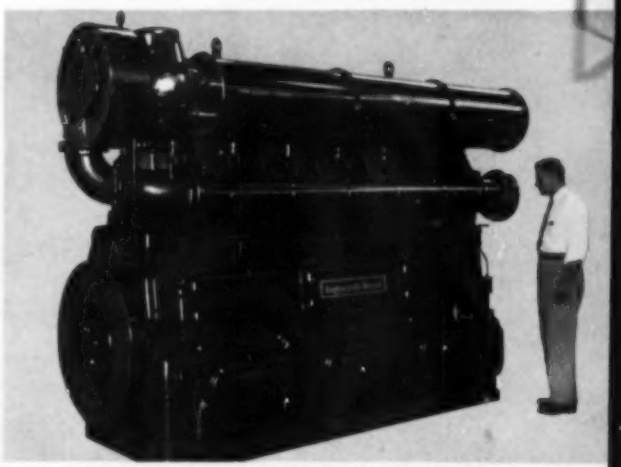

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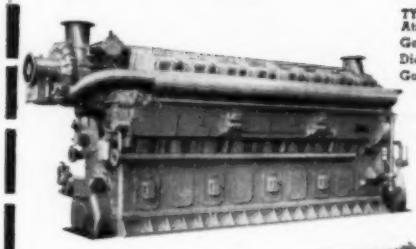

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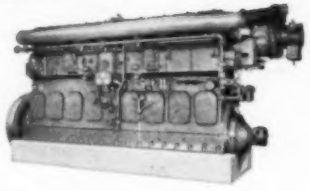
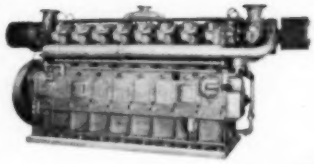
Atmospheric and Supercharged
Gas ..... 1440 to 3700 hp.
Diesel ..... 1650 to 3700 hp.
Gas-Diesel ..... 1650 to 3700 hp.



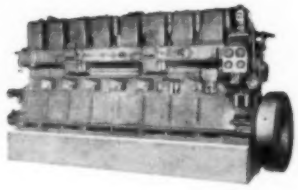
TYPE LS ..... 6, 7 or 8 cyl.
Atmospheric and Supercharged
Gas ..... 720 to 1850 hp.
Diesel ..... 825 to 1850 hp.
Gas-Diesel ..... 825 to 1850 hp.

WHEN IT COMES TO POWER...

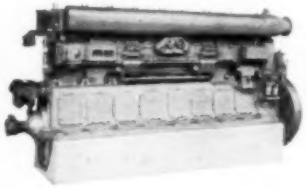
the better it "fits", the less it costs!



TYPE FV ..... 6, 8, 12 or 16 cyl.
Diesel—
Atmospheric ..... 290 to 1230 hp.
Diesel—
Supercharged ..... 420 to 1850 hp.



TYPE IS ..... 5, 6, 7 or 8 cyl.
Atmospheric and Supercharged
Gas ..... 375 to 1500 hp.
Diesel ..... 430 to 1500 hp.
Gas-Diesel ..... 430 to 1500 hp.



TYPE GS ..... 5, 6 or 8 cyl.
Atmospheric and Supercharged
Gas ..... 320 to 1200 hp.
Diesel ..... 300 to 1200 hp.
Gas-Diesel ..... 300 to 1200 hp.

The Cooper-Bessemer Corporation

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